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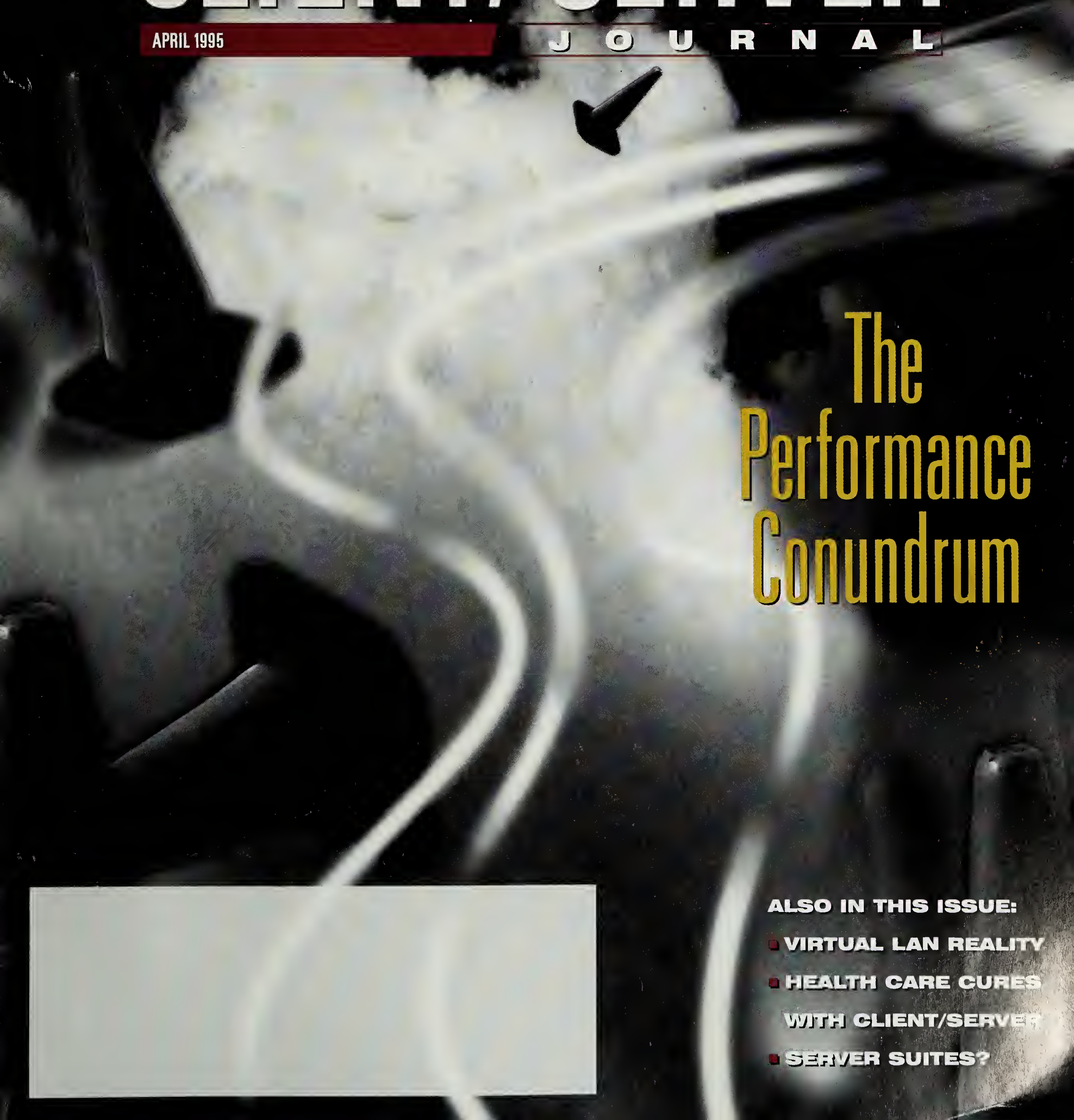
CLIENT/SERVER JOURNAL

APRIL 1995



The Performance Conundrum

ALSO IN THIS ISSUE:

- VIRTUAL LAN REALITY
- HEALTH CARE CURES WITH CLIENT/SERVER
- SERVER SUITES?

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COVER STORY

The Performance Conundrum

30

Concerns over client/server systems' ability to perform up to snuff are not unfounded. Performance management and capacity planning tools are virtually nonexistent for client/server. While users wait for vendors to deliver, they're using homegrown statistical simulation, benchmarking and queuing models to help them build superior performance into their applications from the get-go. *By Avery Jenkins*

Psst . . . Looking to get more from your client/server environment? Read our cover package for precious performance tips.

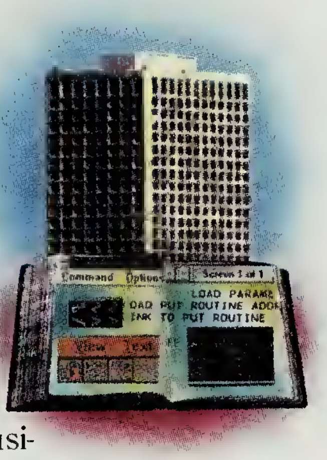
Firing On All Cylinders

35

Much of client/server's performance depends on the network infrastructure. In response, some organizations are setting up virtual LANs, which use packet-switching and/or cell-switching technologies to enable nodes to access services or data regardless of the network's physical composition. This approach, however, adds unprecedented complexity and perplexity when it comes to managing the internetwork. *By Elisabeth Horwitt*

THE INTERNET

A Tangled Web



16 While businesses are joining the Internet in record numbers, few have begun the serious work of re-architecting their back-end systems for real electronic commerce. And without elegant connections between these systems and those that link to the Internet, breaking conventional business boundaries will not happen any time soon. *By Ellis Booker*

BUSINESS INTELLIGENCE

When Data Is Not Enough

25 Enlightened organizations are tapping a variety of client/server technologies to rig up so-called "business intelligence systems" that enable PC users networked across the enterprise to access and analyze key sales, marketing and trends analysis data. Though the tools of the trade vary by organization, in many cases users can extract data from mainframes for further analysis and/or business modeling. *By Willie Schatz*

VERTICAL MARKET FOCUS: HEALTH CARE

A Healthier Existence

21 Though the threat of federal health care reform has largely vanished, the industry is under major pressure to cut costs from insurance companies, HMOs and employers that must pay for workers' medical benefits. In response, a small but growing group of hospitals, HMOs and medical centers are using client/server to automate patient care and record-keeping processes. *By Steve Alexander*

PROJECT MANAGEMENT

Taming The Beast

40 The complex nature of any large client/server project means its manager must be deft at balancing everything from planning, prelaunching and launching a project to building a project team. Fortunately, new client/server-specific tools are arriving to help match people skills with systems requirements, track project performance and help ensure that programs built meet specifications. *By Cheryl Gerber*

FROM TOP TO BOTTOM: ILLUSTRATION BY ANDREW FAULKNER; ILLUSTRATION BY J. W. STEWART; ILLUSTRATION BY JOHN BAXTER/ACME DESIGN CO.

COMPUTERWORLD

CLIENT/SERVER JOURNAL

SERVER SUITES

How Suite It Is?

46 Microsoft's evolving BackOffice suite, which contains applications server, database, systems management, mainframe connectivity and messaging components, is an alluring temptation for organizations that buy Microsoft's religion. Yet some nonbelievers say it could lead to single-vendor lock-in.
By Lynda Radosevich

CASE STUDY

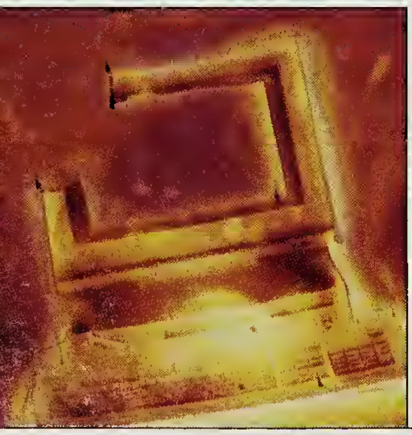
Laying Down The Pattern

50 Unifi, Inc.'s business process re-engineering plan is now complete. The company is also giving users a taste of graphical client/server computing: Unifi installed Microsoft's Office, allowing some 250 employees to share information and exchange messages. *By Alan Alper*

INTERVIEW

A Work In Progress

52 R. Douglas MacIntyre took over as top boss at Dun & Bradstreet Software in mid-1994, when the firm's client/server strategy was under siege. He has overseen the delivery of the firm's long-awaited suite of business packages, but he still has work to do distinguishing D&B Software's strategy.
By Rosemary Cafasso



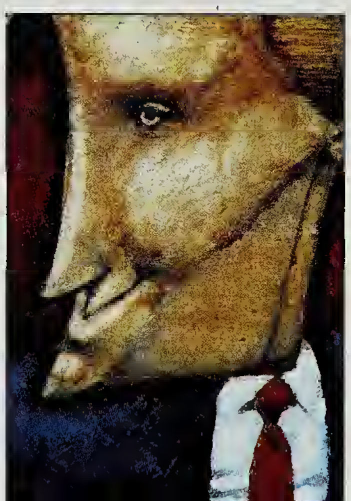
BUSINESS CONTINUITY

Courting Disaster

55 Business continuity planning is much different in the new age of distributed computing than it was with the mainframe. Planners need to work out the actual technology needed for the backup site, who is essential in the event of a disaster, what type of data backup is used and who takes care of tape rotation and backup procedures. *By Richard Adhikari*

CAREERS

Perceptions Die Hard



59 It's not easy making the transition from Cobol/CICS/DB2 to client/server nirvana, even if you take the time to learn the tools and techniques.
By Roy Altman

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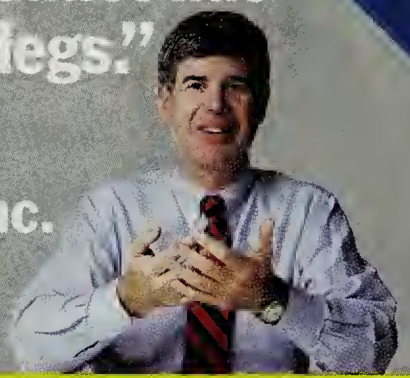

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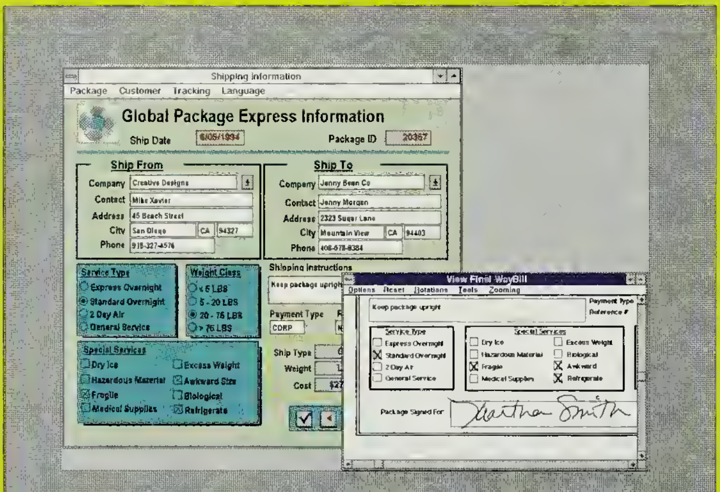

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Ship Date 6/05/1994
Package ID 20367

Ship From
Company Creative Designs
Contact Mike Xavier
Address 45 Beach Street
City San Diego CA 94327
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Ship To
Company Jenny Bean Co
Contact Jenny Morgan
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City Mountain View CA 94403
Phone 408-678-8384

Service Type
○ Express Overnight
● Standard Overnight
○ 2 Day Air
○ General Service

Weight Class
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○ 5 - 20 LBS
● 20 - 75 LBS
○ > 75 LBS

Special Services
☐ Dry Ice
☐ Excess Weight
☐ Hazardous Material
☒ Awkward Size
☒ Fragile
☐ Biological
☐ Medical Supplies
☒ Refrigerate

Shipping Instructions: Keep package upright
Payment Type CORP

View Final WayBill

Keep package upright

Service Type
☐ Express Overnight
☒ Standard Overnight
☐ 2 Day Air
☐ General Service

Special Services
☐ Dry Ice
☐ Excess Weight
☐ Hazardous Material
☐ Biological
☒ Fragile
☒ Awkward
☐ Medical Supplies
☒ Refrigerate

Package Signed For Heather Smith

Package Customer Tracking Language
Options Reset Rotations Tools Zooming
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If you've tried this, you know what we're talking about. First-generation tools don't have brains behind the beauty. The applications you build with them just don't scale. If you want power, if you want performance, you need more. You need a tools *architecture.*

Judith Hurwitz, President, Hurwitz Consulting:

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JOURNAL

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EDITOR'S NOTE

Alan Alper

The Internet seems destined to become the information highway's commercial fast lane. That means the industry will have to come up with a more foolproof way to secure the 'net.

The Internet is no longer the exclusive province of *Wired* magazine, as I found out one recent Sunday. I observed major treatments of the subject in both *The New York Times* and *The Boston Globe* as well as a segment about Internet hacking on CBS's *60 Minutes*. It doesn't get more mainstream than that!

Such widespread coverage made our decision to lead this issue with a story on the commercialization of the Internet a bit dicey. Our fear was that the piece could be seen as faddish, given all the recent attention this ever-expanding "network of networks" has received. But the Internet seems destined to become the information highway's commercial fast lane, and we hope our coverage will help defog things a little.

As our piece makes clear, leveraging the ultimate client/server network as an effective business conduit may take some time and effort (see "A Tangled Web," page 16). Though businesses are joining the Internet in record numbers, few have begun rearchitecting their back-end inventory, billing and customer support systems to link with front-end systems that permit users to "hypertext" their way across countless content-laden World-Wide Web servers.

Today's technology, for example, lets customers access catalog information on an Internet home page or post orders on a bulletin board. However, leads and orders obtained via the Internet still have to be re-keyed into order-entry or billing systems.

What will make the Internet a high-speed commercial highway — and "buyway" — is technology that enables customers to place orders directly to a supplier's system, similar to electronic document interchange. Yet technology that links front- and back-end systems is under development at only the most pioneering of organizations.

Only when these watertight links are in place can the Internet help organizations break conventional business barriers and expand their market presence. But this won't happen until both sellers and buyers are sure that transactions containing accurate quantities and style numbers can be transmitted with full integrity and security.

That means the industry will have to come up with a more foolproof way to secure the Internet. Corporate America will not open its mission-critical systems until it has a reasonable guarantee that the upside advantages of heightened visibility and accessibility on the 'net will translate into increased revenue and profits and will more than make up for the downside prospects of having data pilfered.

From there, organizations can concentrate on receiving payment directly over the Internet in the form of bank funds transfers (for business-to-business transactions) and debit cards (for consumers).

Until tighter systems linkage, security, integrity and payment issues are ironed out, doing business on the Internet will be relegated to the tire kickers, beta testers and browsers of the world. ◩

Alan Alper

INTERNET: aalper@cw.com

PHOTOGRAPHY BY STEPHEN SHERMAN

Letters

I REALLY ENJOYED THE ARTICLE “One Bit at a Time,” since I feel that a good data architecture is often overlooked in most projects’ haste to get to writing code.

I did, however, disagree with the part of Marc Myers’ quote stating that a data model represents the data flows for a business. This would be accurate if we were speaking of a process model or an enterprise model that would include both a data model and a process model.

My one-sentence definition of a data model is: the consolidated view of all the information required by an organization to conduct its business now and in the foreseeable future.

Thanks for a great magazine!

DAN SUTHERLAND, CCP
Senior systems analyst
MCI Telecommunications
Colorado Springs

GREAT IDEA ON THE CAREERS SECtion. We’ve recently hired a director of personnel specifically for our client/server division.

P.S. Cool cover art on the February issue.

JEFF ANDERSON
Public relations, client/server technology
Electronic Data Systems Corp.
Plano, Texas
anderson@onramp.net

I AM A TECHNICAL WRITER WORKing at Monsanto, and I just read your editorial in the February 1995 issue of *Client/Server Journal*.

I can’t let you get by with using a made-up word like “architected.” What’s wrong with simply saying “designed”? And this in an issue containing an article (“Change Is Our Friend” by Eric Singleton) stressing the importance of communication.

I like the magazine but would prefer not to see its quality diminished by editorials containing words (or nonwords) with ambiguous meanings.

DAVE BALDWIN
Technical writer
Monsanto Corp.
St. Louis
dabald@ccmail.monsanto.com

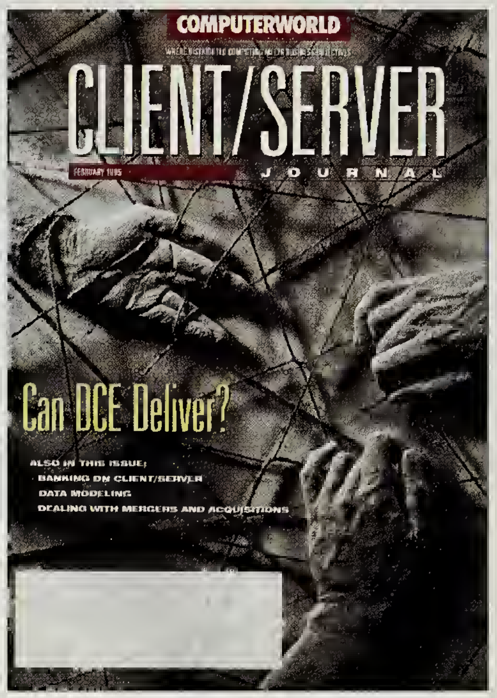
Editor’s note: Mea culpa, mea culpa. You are indeed correct. However, if we took such a narrow perspective on the use of language, words like “designed” and “made” would be in almost every sentence. It would get tedious to write (and read). Sorry to offend you, but we look at word creation as freedom of speech or literary license. You must not have approved of our coinage of the phrase “client/serverizing,” either.

LET ME TAKE THIS OPPORTUNITY to pass on my accolades for a great magazine/journal. All issues are “keepers.”

I subscribe to many PC mags to keep myself abreast of the current trends and technologies and rarely read the entire magazine — mainly, items of interest — *but* every copy of *Client/Server Journal* has been read from cover to cover. Truly a remarkable magazine!

Again, keep up the good work.

RALPH S. JACOBSEN
President/Owner
RSJ & Associates
Fayetteville, Ark.



I WANT TO COMMEND AND THANK you for the approach that *Client/Server Journal* takes in addressing the issues surrounding application development and system support in the client/server environment.

The *Journal* consistently points out both the positives and negatives of client/server while keeping in perspective the fact that it is not for everyone, especially the naive or uncommitted.

As a client/server systems integration and consulting firm, we find that the *Journal* presents my customers and prospects with a realistic viewpoint. This viewpoint is not one often offered by other sources. It’s encouraging to have a partner in putting a realistic framework around emerging technologies.

PETE STEINER
Executive manager
Innovative Information Systems, Inc.
Norwood, Mass.

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COVER ILLUSTRATION BY ALAN BRUNETTIN

INSIGHTS

A REVIEW OF CLIENT/SERVER VIEWS AND EVENTS

Bradlees Takes Stock of Client/Server

Retailers have always equated success with location.

But in today's ultracompetitive world, location has as much to do with optimal data placement as it does with walk-in traffic.

By early last year, Northeast regional retailer Bradlees, Inc. decided it could no longer tolerate dislocated data. It began planning an enterprisewide client/server environment that would allow independence by July 4, 1997, from the mainframe it shares with former parent The Stop & Shop Cos.

Bradlees hired a retail-savvy chief information officer, who tapped Sybase, Inc. consultants to help craft a reengineering blueprint. Some $35 million was earmarked to exit the mainframe and build a cross-functional, client/server network.

Judy Newdom parted ways with Bradlees and its mainframe

Theory is great. Reality bites. Lackluster 1994 results and a better appreciation of the costs and challenges involved in client/server computing is forcing the Braintree, Mass.-based company to decelerate its plan. In fact, management at the $1.9 billion retailer recently decided to upgrade — rather than purely maintain — mainframe applications.

The client/server curtailment abruptly ended the 16-month reign of CIO Judy Newdom. Overseeing production support as well as modifying and maintaining the mainframe "is not stuff I like or want to do," she said.

Despite Newdom's departure, Bradlees is forging ahead, albeit more slowly. The retailer is using Powersoft's PowerBuilder in a pilot project to build a promotion planning system that will tie together the buying, planning and advertising departments. The project is slated to move into production later this month or early next — about five months behind schedule.

"In hindsight, we took a RAD approach that was a little short-sighted," said Kevin Maloney, director of financial and store systems. "We jumped right into prototyping but should have stayed longer with defining requirements, scoping and collecting data."

The decision support system was designed to alleviate the vast amount of paperwork required to plan what Bradlees would promote, when, at what price and in what type of ad. The system will eventually enable some 300 Windows PC users to share data residing on a Unix-based Sybase System 10 database server over a TCP/IP network.

Bradlees is also rolling out client/server systems on two other fronts: an in-store labor analysis system and PeopleSoft, Inc. financial and human resources applications, Maloney said. New Chief Executive Officer Mark Cohen is seeking a new CIO to work up a less aggressive client/server plan, he added.

Meanwhile, Bradlees' information systems staff is running hard to keep up. "We're struggling with building an infrastructure to replace the old mainframe," Maloney said. "We need help with technical support and in operational areas. . . . We relied on our partnership with Stop & Shop for those things for a number of years." ◪

Written by Alan Alper, editor of Computerworld Client/Server Journal.

SNIPPETS

☞ "Services, services, services" was the mantra heard at the "Dataquest Predicts — 1995 and Beyond" conference. The need for services can be attributed to a "technology assimilation gap" — e.g., firms are introducing technology faster than users can understand it, yet they keep acquiring technology because of its perceived competitive advantage. They then have outside parties help them assimilate the technology to gain the advantage.

☞ "G2 Monthly" is also predicting a big market for client/server services. The reason: Companies are frustrated by the hidden costs of help desks, support personnel and education/training. According to the newsletter, unbudgeted client/server support costs can range from 22% to 48% of stated costs. This gives service providers a window of opportunity if they can demonstrate the benefits of outsourcing.

☞ Making client/server pay off is an issue on every IS manager's mind. One way to ensure payback is to get creative. According to a Forrester Research, Inc. report, businesses need to experiment in three ways: create new products, achieve excellent customer service and reduce costs. Forrester said line-of-business experimentation will cost only 10% of firms' total technology budgets but will impact the bottom line.

PHOTOGRAPHY BY JAY REED

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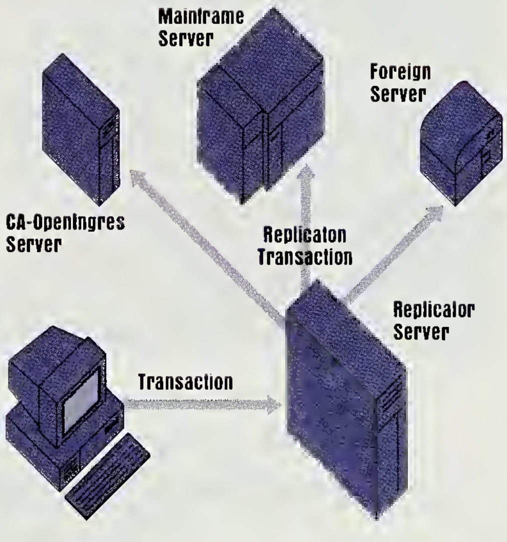

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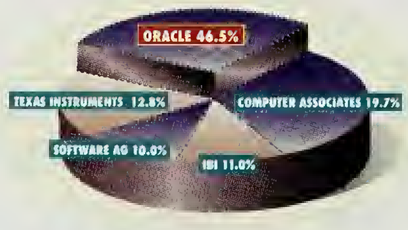
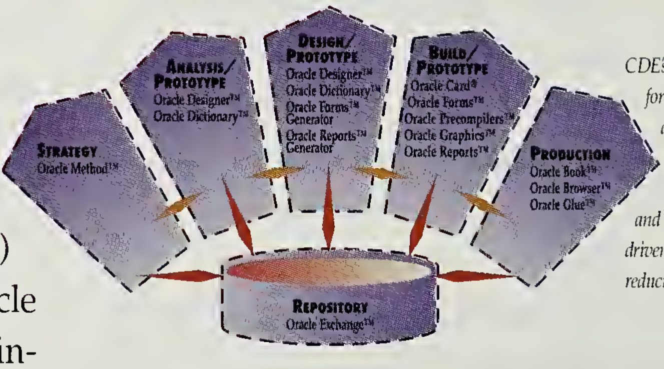


*Oracle sells more tools than any independent software company.**



CDE's open, integrated solution for enterprise-wide client/server applications development covers the entire development cycle. It includes CASE, 4GL, 3GL and enduser tools in a repository-driven modular approach to reducing development time.

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Project Periscope

☞ CLINICAL CLIENT/SERVER

Cancer research is a complicated animal, as the Fred Hutchinson Cancer Research Center in Seattle can attest to. Its Women's Health Initiative clinical trial, which will study the connection between breast cancer and osteoporosis, diet and lifestyle, faced some hefty technology concerns. The trial will track the lifestyles of 160,000 women over 15 years at 45 clinics nationwide. The center needed a system that, in addition to handling all of that data, would still be viable in 10 years, have the ability to grow and be easily deployed. A client/server platform based on Oracle Corp. and Novell, Inc. was chosen. The center uses a file server at each clinic running OracleWare with five PCs connected to it. To date, 16 clinics are on-line, and the rest are expected to be up and running by year's end. [For more on client/server's role in the health care industry, see "A Healthier Existence" page 21.]

☞ BUILDING A HOME FOR CLIENT/SERVER

In the retail business, the customer comes not only first but also second, third and fourth. With that in mind, Hechinger Stores Co., a $1.02 billion home center retailer, has signed a contract with Hewlett-Packard Co. to replace its legacy financial systems and bring in client/server-based merchandising and decision support capabilities. Hechinger is replacing its IBM 9100 mainframe with two HP 9000 Unix servers. All corporate users will be connected via a Token Ring LAN. The system also includes HP's OpenView system management tools; Kenan Technologies, Inc.'s Acumate ES database and development tools; and PeopleSoft, Inc.'s Financials running on an Oracle database. The retailer is now taking advantage of retail application software for accessing merchandising information and for its general ledger. Acumate and PeopleSoft's Financials provide Hechinger's managers with more timely and accurate business information, while they enable the company's buyers to monitor sales and inventory data to better respond to customer buying trends.

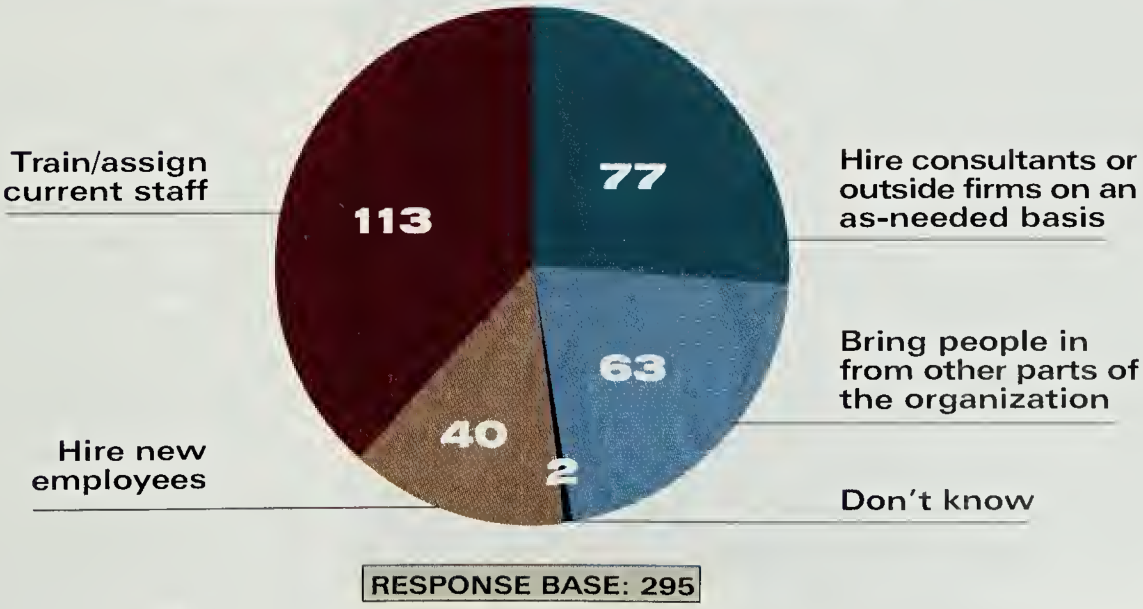
☞ FIRST ALBANY INVESTS IN FINANCIAL SYSTEM

Investment banking and regional brokerage firm First Albany Corp. has invested in Computron Technologies Corp. for its client/server financial and workflow/imaging software. Computron's N-dimensions General Ledger, Accounts Payable and Fixed Assets applications are installed on First Albany's new IBM RS/6000 server. The general ledger and accounts payable applications have been live since Oct. 1. Computron's Epic/WF workflow management system and Computer Output On-Line (COOL) applications are also part of the deal. One application has been designed with Epic/WF, and the investment bank is in the process of developing others. Using Epic/WF, the bank hopes to reduce paper trails and increase productivity. Workflow is being used at the bank in conjunction with optical scanning and storage in order to manage the handling of images and replace paper flow. First Albany has a milestone date of April 1 to eliminate a significant amount of paper between branches. COOL is a report and archival management system that will allow the Albany, N.Y., investment bank to better archive and access report data such as financial statements and customer trading activity. COOL converts print files into a screen-readable format and indexes by fields indicated by the bank. First Albany uses COOL to access 700 reports a day. COOL also offers users instant, on-line information access from the back-end optical storage jukebox, which provides permanent storage of files and reports and replaces the microfiche systems now used. April 1 is also the formal cutover to COOL, eliminating the microfiche for good. The system will ultimately support 125 users in 28 offices.

INTERNAL INVESTMENT

Good project managers are hard to come by, according to 40% of IS managers surveyed. So most organizations turn to their own staffs to find and train project managers. For more on project management, see story page 40.

WHICH OF THE FOLLOWING DESCRIBES HOW YOUR ORGANIZATION FINDS CLIENT/SERVER PROJECT MANAGERS?



Source: Computerworld *Database Division*

NY Goal: More, Cleaner Blood

Client/server system to improve record-tracking, increase safety of donations

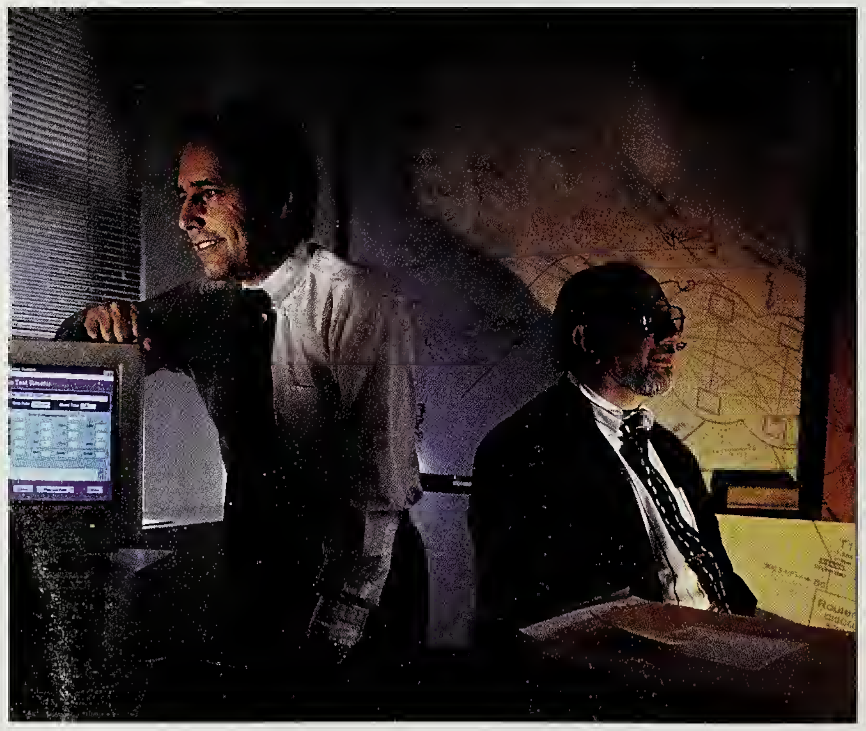
Blood banks work with tough statistics. Consider that they rely on a tiny 4% of the U.S. population to supply 80% of the nation's blood. HIV has made things even more complex, said Dr. Celso Bianco, vice president of medical affairs at the New York Blood Center in New York, which provides 10% of the U.S.' blood supply.

Doubling the number of laboratory tests, for instance, has resulted in safer but less blood. "We need to recruit more donors and deal with current donors in a more efficient way," said Edwin Streun, director of regulatory affairs at the center.

Unfortunately, there's nothing efficient about most blood banks' donor records systems. Until recently, the New York Blood Center system was based on an unwieldy, 20-year-old Digital Equipment Corp. PDP-11. And while testing has increased safety, clerical errors made during donor screening and record-checking account for half of all problems that occur, experts said.

The New York Blood Center is doing something about this. Four years ago, it dedicated itself to a painstaking redesign of its donation process. And late last month, it was scheduled to roll out one aspect of that redesign: SafeDonor, a client/server system intended to track and manage the records of its 4 million donors.

"If you donate three times a year, that's 27 pieces of [blood-related] information" resulting from nine lab tests, said Armando Pinto de Souza, a consultant hired by the center. Add 300 pieces of data such as blood pressure and questionnaire responses gathered during blood collection, and "all this must be cross-checked to make sure the blood is safe," he said.



Pinto de Souza (left) and Bianco were instrumental in donation redesign

Currently, record-keeping is extremely time-intensive. If a particular hospital were to request a rare blood type, the center would have to search millions of records on stand-alone PCs or the PDP-11.

With the new system, users can get an answer in seconds by querying an Oracle Corp. database through an interface designed with Powersoft's PowerBuilder. The database will be centralized on a Digital Alpha Server 2100. Four regional centers will run SafeDonor locally on Novell, Inc. LANs and tap into the database via a frame-relay wide-area network.

SafeDonor's expected benefits are fivefold: improve record-keeping (thereby increasing safety and supply); remove manual error; sharpen recruitment efforts; provide "cradle-to-grave traceability," according to Bianco; and expedite blood delivery.

"Being able to manipulate large databases and look for correlations — that improves safety all by itself," explained Edward Steane, executive director of the International Council of Commonality in Blood Banking Automation in Bethesda, Md.

Eventually, the center wants to place a front end at the collection sites themselves.

"Most systems today are intended to see if someone donated that shouldn't have," said Paul Cumming, president of Talisman Ltd., a medical systems consulting firm in Falls Church, Va. "It's much more desirable to not let [risk] in to begin with." ◪

Written by Mary Brandel, senior editor of Computerworld Client/Server Journal.

TRICKS OF THE TRADE

Certain keys to a successful client/server implementation have emerged through the work of early adopters. Keep them in mind to achieve success with your forays into client/server.

- **Think 'enterprise scalability'**
- **Choose the right moment**
- **Ensure that the whole company is committed**
- **SSH: Small, simple, high payback**
- **Foster a learning culture**
- **Don't underestimate your end users**
- **Select suppliers you can work with**
- **Limit the number of technologies and suppliers**
- **Select an application partitioning scenario carefully**
- **Integrate old and new development styles**

Source: Ovum Ltd., London

PHOTOGRAPHY BY EDWARD SANTALONE; ILLUSTRATION BY STEPHANIE FAUCHER

Raising the Bar

The rapid pace of technology change leaves many corporations in a state of competitive flux

BY JONATHAN VAUGHAN

Like forecasting long-term weather, predicting technology futures is notoriously unreliable. While continuing trends such as Moore's Law (which states that every 18 months the complexity of silicon components will double and their prices halve) hold true, identifying the next major technology shift is as hard today as when the first PCs were marketed as hobbyist computers.

Where now are the promises of Josephson Junction supercomputers or pen-based computing, let alone videotext?

If your business strategy calls for technology leadership, it is important for you to respond to the unpredictability of technology.

First, unpredictability places high hurdles in the path of effective new technology implementations; vendors, products — indeed, whole technologies — may not evolve as quickly as expected. Second, it is easier and cheaper to support mature, slow-changing technologies.

To deal with the challenges of change, we need to be able to respond quickly to changes in technology direction, to implement new technology effectively and to integrate it rapidly with our legacy environments.

For example, the current generation of desktop development software, such as Microsoft's Visual Basic and Powersoft's PowerBuilder, allows the creation of GUIs to a PC relational database using point-and-click tools. Compared with the leading development tools of the late 1980s, these tools provide revolutionary productivity and capability for a modest price.

Nevertheless, their very ease of use can be a trap. In the areas where the new tools fall short, such as team-based version control, software distribution, legacy systems integration and performance scalable to the highest levels — areas that are critical to building robust, enterprise, client/server systems — the developer is left not only without support but also unaware of the problems he needs to overcome.

And as if the barriers to implementing new technology were not high enough, there are also difficulties on the support side. Partly because of the uncertainty over which environment will be the market leader, software and personnel to support new technology lag behind the development tools by several years.

For example, only now are we beginning to see distributed systems management tools that integrate support for clients, networks and servers. Implementing new technology means pioneering the support environment as much as the technology.

In a series of client/server projects, Chase has linked a strong corporate technology program with both the needs of individual project teams to implement new applications and a corporate upgrade of support capabilities. Our approach includes the following:

- A program of internal training that integrates new development tools within an overall corporate framework.
- An expert review of systems architectures and development projects to ensure we build successfully on our corporate experience
- Vendor partnerships to improve the capabilities of tools.
- Limited hardware and software standards for core technology to reduce support costs and simplify implementation.
- Development of client/server-specific support capabilities over a series of projects by drawing from Chase's mainframe and LAN support staff.
- Establishment of centers of excellence to build a sense of community and to share expertise in new technologies.

Like competitive high jumpers, Chase starts with the bar set at the height of prior jumps and then raises it. If new technology does not offer more than our existing environment, then we must increase our efforts to improve our techniques.

Each company must identify why it should use technology and how much it should spend — i.e., what competition it is in and how high it must raise the bar to win.

Vaughan is president of applications systems technology at The Chase Manhattan Bank NA's corporate technology and information services group. His CompuServe ID is 70403, 2557.

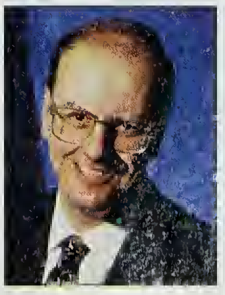


ILLUSTRATION BY ANDREW POWELL; PHOTOGRAPHY BY REINHOLD SPEIGLER

A TANGLED WEB

Businesses struggle to leverage the Internet

Not so long ago, in the early days of electronic data interchange (EDI), a visitor to the data center of a large company asked to see the EDI setup. "Right over here," said the proud information systems director, showing his visitor a stand-alone computer busily printing invoices. "We take these off several times a day and input them into our order system," he explained.

Today's frenzied rush to conduct business via the Internet is remarkably similar: legacy systems that are unattached (or loosely attached) to Internet front-end systems. And without elegant connections between mission-critical business systems and on-line links, the potential of electronic commerce is severely limited.

To be sure, companies will continue to use the Internet as a marketing channel — a place to publish information about themselves and their prod-

Please turn to page 18

BY ELLIS BOOKER

ILLUSTRATION BY J.W. STEWART

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Continued from page 16

ucts — as well as to communicate with customers and business partners. But the Internet is capable of far more. Viewing the 'net merely as a gigantic bulletin board or electronic-mail system badly misses the point. With its extraordinary scope and growth, this global network of networks' true future will be to support distributed applications across companies and geographic boundaries.

REARCHITECTING FOR SUCCESS

While businesses are joining the Internet in record numbers, few have begun the serious work of rearchitecting their back-end business systems (inventory, billing, customer support, etc.) to prepare for the dawn of true electronic commerce and the virtual corporation.

Analysts point out, correctly, that investment in such integration work will occur only when it can be cost-justified — that is, when firms begin to see significant revenue coming through their cyberspace doorways. That's just not the case, given today's minuscule transaction volumes.

Moreover, many organizations remain worried about the Internet's security, which has been a hindrance to its commercialization (see story page 20).

Regardless of these concerns, the desire to have a presence on the Internet, with its native client/server architecture, is just one more incentive for companies to migrate to distributed computing for their core business applications, according to Jay Batson, senior analyst at Forrester Research, Inc. in Cambridge, Mass. "It adds to the list of pressures on the need to shift," he said. "It is not enough to force the change itself, but it may be the straw that breaks the camel's back."

But some users who have already begun to implement Internet-based businesses are strident about the need to rearchitect. "Most of these companies have simply dusted off their retail, order-entry and customer support [systems] and said, 'OK, we're ready for interactive networks,' " noted Bill Tobin, president of PC Flowers in Stamford, Conn. "This just doesn't work."

NET METRICS

- **According to the Internet Society in Reston, Va., nearly 5 million hosts existed on the Internet as of late January 1995. The growth of the .com domains, those of commercial enterprises, has been the fastest, at 24%. Significantly, there were more .com domains — 1.5 million — than there were total Internet domains in January 1993. The Internet has grown by over 128% since last January.**

- **Forrester Research's survey last September of Fortune 1,000 corporations found that two-thirds had an Internet Protocol link.**

- **According to other estimates, there will be 100,000 commercial entities on the Internet by 1997 and well over 1 million by 1999.**

- **The electric power and communications industries have the highest 'net presence. Roughly 38% of the 218 communications companies surveyed and 34% of the 159 power firms polled said they had an Internet-registered domain, network or host, according to Internet Info, a Falls Church, Va., watchdog.**

PC Flowers, which has been on various on-line networks for the past six years and has fulfilled 1.5 million electronic transactions, expanded its service to the Internet last December. Using a graphical Internet browser similar to Mosaic or Netscape, customers log on to the PC Gifts & Flowers home page to view pictures of products ranging from stuffed animals to floral arrangements.

For Valentine's Day, the company launched a unique approach to cross-marketing in cyberspace using an "electronic token" system. Developed by IBM, the system enables PC Flowers to track which organizations' home pages are attracting sales and compensate them accordingly, Tobin said.

Yet PC Flowers is not taking orders from consumers over the Internet because a standard, secure way to send credit data through cyberspace is not quite ready.

The key phrase is "not quite." There are a number of secure servers, browsers and applications pending that implement encryption and authorization techniques for cyberspace commerce.

For example, Evergreen CyberMart, Inc., which handles cybersales for catalogers such as Spiegel, Inc. and Robert Redford Sundance Catalog, is sending secure electronic order forms to its merchants, discrete from their back-end systems. For example, an E-mail order form sent by a customer to CyberMart is routed to the appropriate catalog company, where it is re-keyed into the company's order fulfillment system. Though not fully integrated with catalogers' customer systems, the approach has one major advantage: It gives them a presence on the Internet.

Ultimately, there will be seamless integration between CyberMart's on-line catalog system and its customers' back-end ordering system. "We're working closely with major catalogers and retailers to integrate our ordering platform into their accounting, inventory and order-fulfillment and credit-card authorization systems," said Phil Broadbent, chief executive officer of CyberMart in Phoenix.

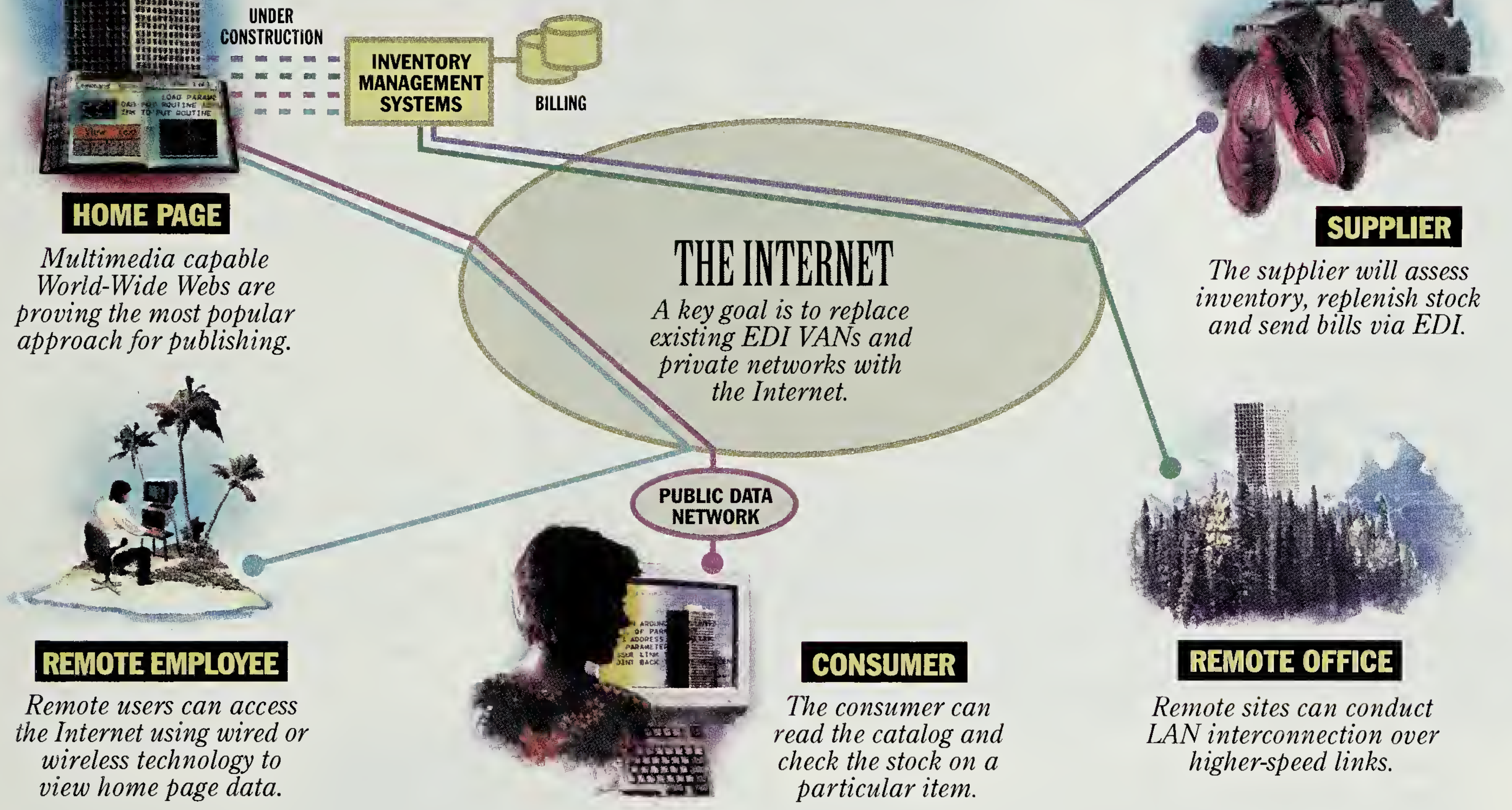
WATCH YOUR BACK END

Still, for practical purposes, cobbling together an Internet front end with an old-style back end is adequate as long as the volume of transactions remains low.

Then again, it is easy to conceive of an enterprising merchant on the Internet who starts offering a must-

BLUE SKY HIGHWAY

Companies today are providing information and conducting some transactions via the Internet. Until the advent of secure servers, however, few organizations will connect their back-end, mission-critical business systems to the Internet.



HOME PAGE *Multimedia capable World-Wide Webs are proving the most popular approach for publishing.*

THE INTERNET *A key goal is to replace existing EDI VANs and private networks with the Internet.*

SUPPLIER *The supplier will assess inventory, replenish stock and send bills via EDI.*

REMOTE EMPLOYEE *Remote users can access the Internet using wired or wireless technology to view home page data.*

CONSUMER *The consumer can read the catalog and check the stock on a particular item.*

REMOTE OFFICE *Remote sites can conduct LAN interconnection over higher-speed links.*

have product (the cyberspace version of the Pet Rock, for instance). If this firm has integrated its on-line presence with its back-end systems, all will be fine. If not, imagine its legacy order-processing system crashing under the strain of thousands and thousands of orders coming day and night from every part of the globe.

Computer products marketer Insight Direct, Inc. in Tempe, Ariz., has already faced this issue. The company receives 2,000 to 3,000 orders daily across its six business units, which themselves generate 500 to 600 faxes, 1,200 to 1,500 credit-card inquiries and 50 EDI transactions. In addition, the company gets 200 to 300 E-mail messages across the Internet every day.

For Insight, the answer was a front-to-back distributed processing system consisting of several Unix servers connected over a TCP/IP network. "We separate machines for outbound faxing, EDI and credit-card processing," said Denny Chittick, vice president of IS.

Three years ago, all these operations resided on one server, but as the number of users (both inside and outside Insight) on the system increased, "we had to off-load some of these services," he explained.

In the past year and a half, Insight has also launched several subsidiary businesses to do targeted marketing for Insight's vendors. "In essence, we create a direct marketing program for them through us," Chittick said.

Significantly, Insight did not replicate its core systems for each new company. Rather, each new "company" gets its own Unix host but uses a common pool of application services, such as the fax server and the EDI server, sitting on other Unix boxes.

With this infrastructure, Insight can launch new businesses more or less on the fly. "It takes no time to bring [them] up since we have everything already set up," Chittick said.

Chittick is especially proud of one system that went into production last November. "If our salesman enters an order and the computer says we don't have it in inventory, the system will offer to drop-ship the product," he explained. The computer checks the product's availability at other suppliers, determines the best price and sends an EDI transaction to the supplier to fulfill the order — all without human intervention.

Could a fully integrated system such as this enable customers to make a query? Yes, but Insight elects not to provide this feature. "We don't want the customer or salesperson to make the decision on which vendor we choose," Chittick explained. The automated system ensures that the selected product can be drop-shipped the same day and at the best price.

To some extent, companies on the Internet are being shielded from the need to rearchitect their back-end systems because transactions involving their back-end systems are

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ILLUSTRATIONS BY J. W. STEWART

Continued from page 19

quite low. At Insight, for instance, only about 20 or 30 orders arrive daily via the Internet. And it is not uncommon for a merchant's World-Wide Web server, which can display text, graphics, audio and even video in an intuitive point-and-click environment, to receive 15,000 visits per week but see only a handful of sales.

Like so many other organizations, Rockwell Network Systems, a unit of Rockwell International Corp. in Seal Beach, Calif., has been using the Internet — more specifically, the Web — to publish information for its customers and suppliers as well as, more recently, internal data. The company uses HyperText Markup Language, the language used to create Web documents that can be navigated by graphical client software, or "browsers," such as Mosaic.

"There's a lot of work right now to use hypertext as the internal dissemination tool," said business development manager Chris Vandenberg. The goal, he said, is to put a Mosaic-like viewer on every desktop.

Rockwell, however, has not implemented on-line ordering. "I think we're 90 to 120 days away from that," Vandenberg said in February. He is waiting for encryption and secure server standards to emerge.

But Rockwell is using its Web pages to take trouble-tickets directly from customers, who fill out a form on the Web page. "People file the tickets themselves and don't have to sit on the 800 line," he said. And here is the rub. Rockwell has not retired its proprietary trouble-ticket system yet, Vandenberg explained, because not all of its customers have access to the Internet. Other companies will undoubtedly be in the same boat: forced for the time being to support two infrastructures, one for customers and business partners who are on the 'net and one for those who are not.

Rockwell finds the prospect of using the Internet to consolidate its five or six EDI value-added networks (VAN) very appealing. "Besides, it would greatly expand our trading partner universe," Vandenberg added, noting that some smaller companies do not communicate with Rockwell electronically today because their volume of business does not justify the cost of a VAN connection.

Incentives such as business expansion and cost containment will give companies a good reason to seize cyberspace. That's what made EDI the driving force it is today.

"You have to keep in mind it took several years [for EDI] to sink home," said Mark Winther, vice president of IDC/Link Resources Corp. in New York. "What drove EDI was large purchasers pushing it."

Others say they think the future will come sooner than that.

"To act like it's not important now is like saying, 'It's only November — it's not ski season yet,'" CyberMart's Broadbent said. "The snow will be here next month, and everyone will want to be on the slope." ◪

Booker is Computerworld*'s senior editor, Networking, in the Chicago office.*

SECURING THE INTERNET

Security is arguably the biggest obstacle to using the Internet for commercial transactions among companies and between companies and customers.

The fear concerns replacing existing secure networks, which are primarily based on point-to-point connections or through VANs, with an anyone-to-anyone infrastructure such as the Internet.

Essentially, Internet security can be divided into two issues.

First, computers on a corporate LAN must be protected from unauthorized access through the Internet-connected server. In general, "firewalls" are proving adequate to isolate these corporate resources from the outside. For instance, a router can be configured as a firewall, allowing only certain types of traffic (based on IP address) to enter the corporate network.

A second, more problematic security problem is how to send sensitive data, such as a user's credit-card number, across the Internet. Ensuring the security of any user's data will demand standardized approaches — unlike firewalls, which can be proprietary — to authentication and data encryption.

Two schemes for secure servers have emerged: Secure HTTP, a standard from the World-Wide Web consortium, and Secure Socket Layer from Netscape Communications Corp.

Several organizations and trials are also working to crack this nut.

One of the furthest along is EDI software company Premenos Corp. in Concord, Calif., which late last year began piloting Internet-based EDI with Cisco Systems, Inc. in San Jose, Calif., Avex Electronics, Inc. and National Semiconductor Corp.

Premenos' approach is to take a standard EDI transaction, wrap it in a Multipurpose Internet Mail Extensions E-mail envelope and then apply public key encryption from RSA Data Security, Inc. in Redwood City, Calif. On the receiving end, the incoming message is decrypted and processed normally through the receiving company's EDI system.

Avex Electronics in Huntsville, Ala., and National Semiconductor in Santa Clara, Calif., began their trial with Premenos in January to send purchase orders and functional acknowledgments peer-to-peer over the Internet. For both companies, the value of Internet-based EDI is twofold: decreasing the cost of transactions and widening the universe of business partners with which they can trade electronically.

In addition, both CommerceNet, an $8 million consortium of Silicon Valley firms, and the Enterprise Integration Network, sponsored by The Microelectronics & Computer Technology Corp. consortium in Texas, are at work on security issues, including EDI across the Internet.

A HEALTHIER EXISTENCE

HOSPITALS, HMOS USE DISTRIBUTED SYSTEMS TO REVITALIZE OPERATIONS

Y STEVE ALEXANDER

Brigham & Women's John Glaser is predicting large savings from client/server: $10 million to $15 million a year

John Glaser can now reminisce about the early 1990s, when Brigham & Women's Hospital in Boston did something almost no other medical facility in the country has attempted: It converted all of its business and patient applications from a proprietary minicomputer to a client/server system.

"Remember, this is a hospital. It works every minute of the day; it never stops. Converting to client/server was like removing the carpet from under a cocktail party without anybody noticing," he said.

In the critical summer of 1993, the 750-bed hospital con-

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PHOTOGRAPHY BY MARK THAYER

Continued from page 21

verted its business and laboratory operations to client/server and at the same time let doctors use a new client/server system to send medical orders to the hospital electronically. About 1,000 new clients were added throughout the hospital for use by doctors, nurses and administrative personnel.

Glaser, vice president of information systems at the 7,500-employee hospital, learned a few things painfully: Developers and IS staffers took a year longer to learn client/server than he had expected, and scaling from hundreds to thousands of clients occasionally produced strange bottlenecks that increased response time twelvefold. (He resolved the bottleneck problems inexpensively by adding servers or redirecting some clients to other parts of the network.)

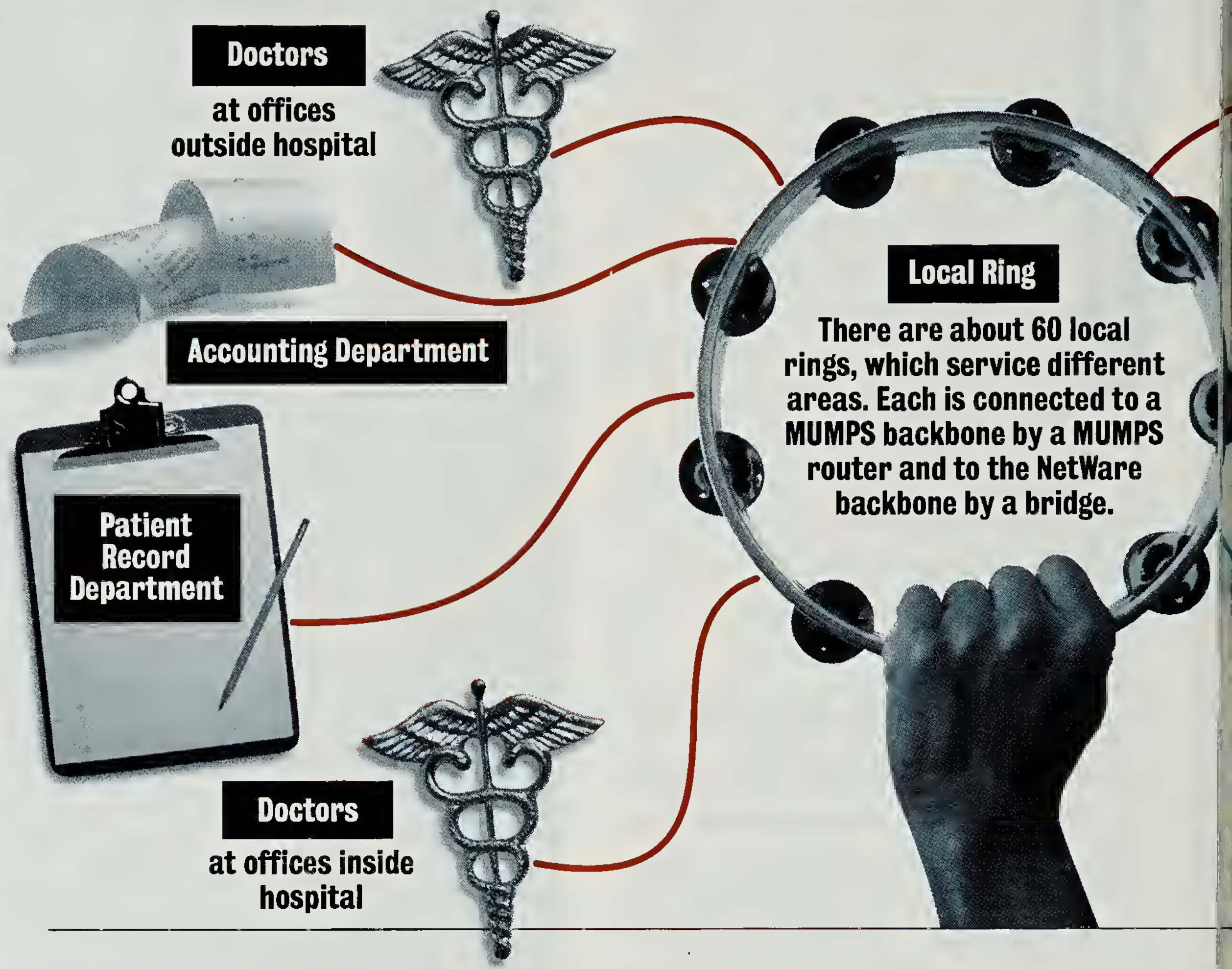
Today, the hospital, with annual revenue of $630 million, has 3,900 Intel Corp.-based PC clients, 35 PC servers and another 35 backup servers that copy all transactions. The network runs 92 major applications ranging from clinical laboratory microbiology to hospitalwide payroll.

So why did Brigham & Women's undergo this risky conversion? Glaser and his counterparts at other hospitals say the answer is simple: Survival in an era when health care costs are being cut dramatically.

While the threat of federal health care reform has largely vanished, the health care industry is under major financial pressures from insurance companies, health maintenance organizations (HMO) and employers, who must pay for workers' medical benefits. In many cases, hospitals have been told they will have to live on less money while providing equal or better quality care in spite of it.

"Automation has been a low priority in hospitals," said Jerry Mathys, executive vice president at Sheldon I. Dorenfest Associates Ltd., a Chicago medical industry IS consultancy. "It's been a fee-for-service, cost-plus market, and only in recent years have they had to look at automation."

Brigham & Women's Hospital Main Network


Doctors
at offices outside hospital
Accounting Department
Patient Record Department
Doctors
at offices inside hospital
Local Ring

There are about 60 local rings, which service different areas. Each is connected to a MUMPS backbone by a MUMPS router and to the NetWare backbone by a bridge.

CHART BY JOHN BAXTER/ACME DESIGN CO.

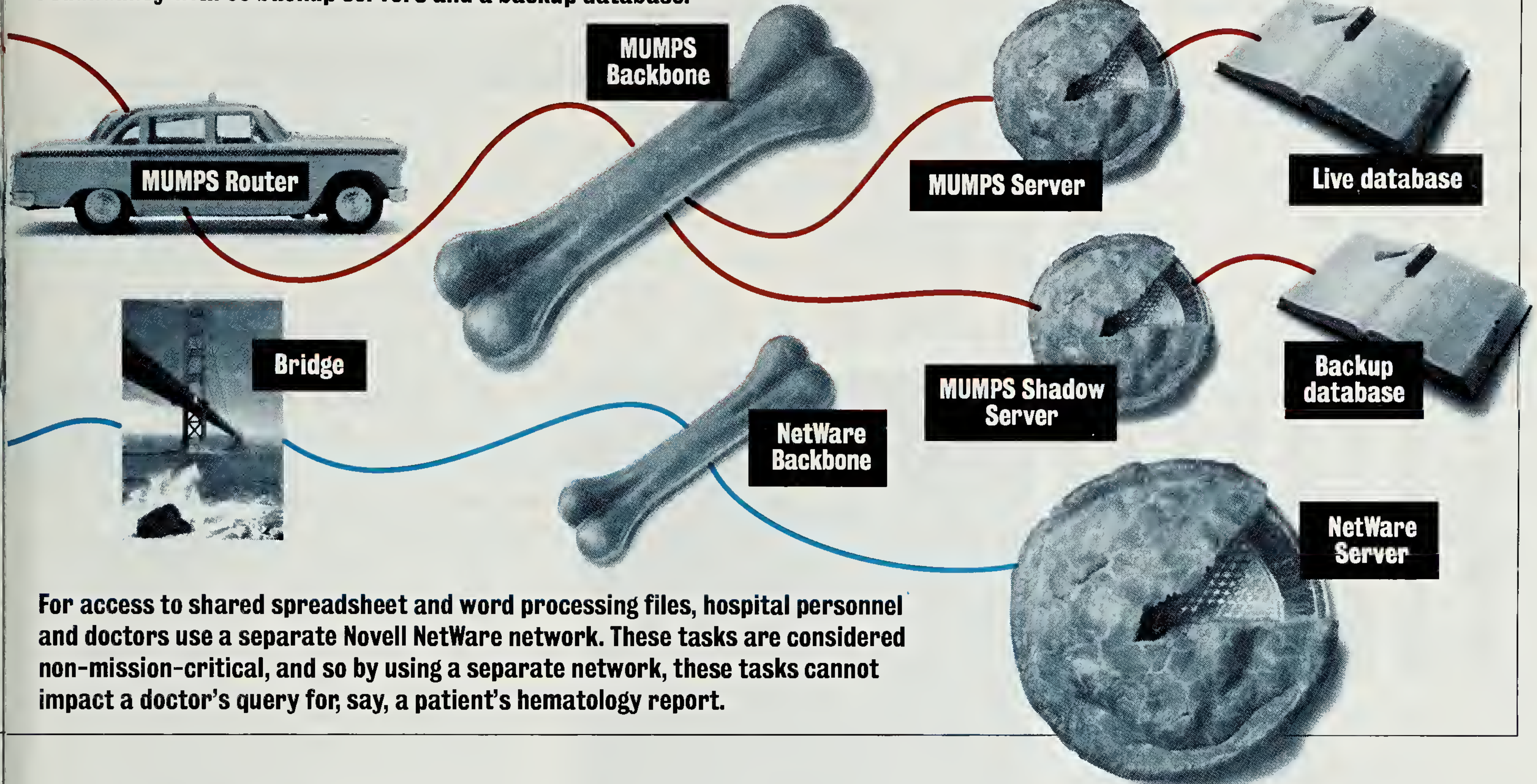
Hence, the medical industry's shift to client/server-based clinical information and financial systems is still in its infancy. O. George Kennedy, an analyst at the Kennedy Group, a Redwood City, Calif., medical consultancy, estimated that of more than 5,000 nongovernment hospitals in the U.S., only 50 to 75 have some degree of client/server computing. That's only 1% to 1.5%. But he predicted that the $7 billion a year spent for medical information technology is likely to at least double by decade's end and that 20% to 30% of that growth will be in client/server.

> **"REMEMBER, THIS IS A HOSPITAL. IT WORKS EVERY MINUTE OF THE DAY. . . . CONVERTING TO CLIENT/SERVER WAS LIKE REMOVING THE CARPET FROM UNDER A COCKTAIL PARTY WITHOUT ANYBODY NOTICING."**
>
> **JOHN GLASER,**
> **VICE PRESIDENT OF IS,**
> **BRIGHAM & WOMEN'S HOSPITAL,**
> **BOSTON**

Many hospital IS executives say client/server computing is one of the keys to survival in the cost-cutting era. That's partly because it allows information sharing among hospitals, doctors and insurers, which tends to reduce duplication of effort and thus keep costs down.

In addition, the software tools available for client/server computing help hospitals, HMOs and other health care organizations analyze where their costs are, said Dan Darland, a Detroit-based partner in Andersen Consulting's health management practice. "When you put cost and demand for information together, client/server becomes part of the solution for a couple of reasons: It can be added on to existing systems fairly inexpensively, and it uses the power of the workstation to put information

Doctors and hospital departments can access 92 applications, such as Results Retrieval and Patient Accounting, via Intel-based PC clients over the hospital's MUMPS network. These applications and all patient information reside on the hospital's 35 PC servers, which process the transactions and feed information back to the clients via the MUMPS backbone. The mission-critical network has complete redundancy with 35 backup servers and a backup database.



For access to shared spreadsheet and word processing files, hospital personnel and doctors use a separate Novell NetWare network. These tasks are considered non-mission-critical, and so by using a separate network, these tasks cannot impact a doctor's query for, say, a patient's hematology report.

in the hands of the people who need to analyze the data," he said.

Brigham & Women's, a leader in client/server, faced an easier conversion than most other hospitals. In the 1980s, it had a homogeneous hospitalwide computer system running on Data General Corp. minicomputers; the conversion to client/server merely moved hospital applications from one uniform system to another.

Most hospitals aren't that lucky. Internally, they often have a mix of computer systems running different operating systems. And as more hospitals merge to cut costs, they are faced with sharing information between two incompatible, proprietary hospital systems.

That is the dilemma Brigham & Women's is now facing. The hospital is merging with 1,000-bed Massachusetts General Hospital, also in Boston, but a merger of the two hospitals' incompatible computer systems is still under discussion. Massachusetts General has a mix of mainframes, minicomputers and client/server systems.

But many of today's hospital client/server efforts are far less extensive than Brigham & Women's. For example, Harrisburg, Pa.-based Capital Health System, which operates two hospitals in Harrisburg and Mechanicsburg, will be shifting part of its internal electronic-mail and business applications to client/server over the next year. In two to three years, it hopes to put lifetime patient clinical records on a client/server system, said Dr. Robert Mandel, Capital's vice president of managed care.

And some medical organizations are still testing client/server computing. Kaiser Foundation Hospitals, Inc. in Oakland, Calif., which operates 32 hospitals and 150 outpatient clinics across the U.S., is experimenting with a client/server-based clinical information system for outpatient records. About 350 of the 8,000 doctors in Kaiser's organization are testing different user interfaces, and by next year as many as 1,000 doctors may be involved.

KEEPING THEIR CHIN UP

Another approach to client/server involves Community Health Information Networks (CHIN), which enable hospitals, doctors, insurance companies and employers to share business transactions and medical records. CHINs allow users to get information from several facilities without having to understand their dissimilar computer systems.

For example, a CHIN in Nashville — Ameritech Corp.-operated Health Information Network of Tennessee (HINT) — uses a client/server system to link doctors with the local Baptist Hospital and will soon connect to its first insurance provider, HealthNet, Inc., also in Nashville. For $49 a month each, 120 doctors can use PCs in their offices to retrieve hospital data such as radiology reports, lab results, electrocardiograms, admissions and discharges, said Carol Hawkins, HINT sales director and acting general manager.

Fred Armstrong, chief information officer at Baptist Hospital, said HINT gives doctors timely access to treatment their patients may have received elsewhere, which should reduce expensive duplication of medical tests. "In the banking world, you can get money from any of your accounts, no matter where you are. In

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Continued from page 23

today's health care, you can't find out what's been done on the other side of the street," he said.

Larry Solomon, director of IS at HealthNet, which runs an HMO and other health plans, said his firm's decision to join HINT will enable doctors to submit insurance claims electronically. Doctors can also electronically inquire about patient eligibility, check which drugs HealthNet will pay for, send HealthNet the forms needed to refer patients to specialists, read HMO guidelines about patient hospitalization and transmit E-mail. In addition, HealthNet will send doctors electronic confirmation of how much it paid on each of their insurance claims.

"It will be a breakthrough in cost containment and efficiency of service," Solomon predicted.

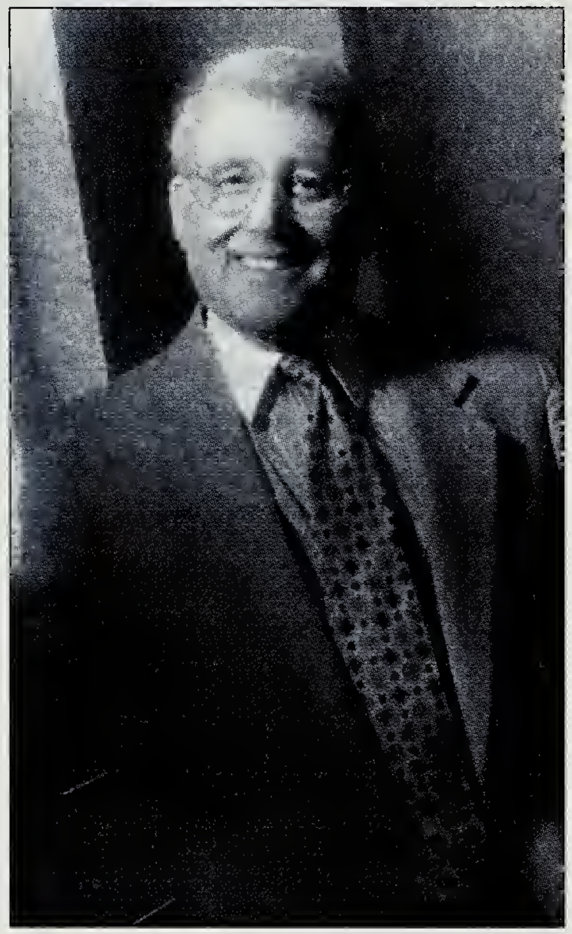
Another CHIN, the Milwaukee-based Wisconsin Health Information Network (WHIN), is jointly owned by Ameritech and Aurora Health Care, Inc., a Milwaukee medical firm that owns nine hospitals and employs 300 doctors. Frank Hoban, general manager of 2-year-old WHIN, said the network uses Sun Microsystems, Inc. servers to link seven hospitals, five insurance plans and 1,100 doctors for the exchange of laboratory results, medical records and patient demographic records. Six more hospitals are preparing to join.

Using PCs, doctors dial up the system over 56K-bit lines linked to a Sun workstation that acts as a switch between user lines. A second workstation at WHIN translates Aurora's patient information into a standard format that all users can read.

"We think client/server is essential," said Jack Steinman, Aurora's vice president of information services. "We just don't see how we can effectively manage our business and maintain our level of quality without it."

Hoban predicted that WHIN could eventually save a hospital from $200,000 to more than $1 million a year by eliminating duplication of medical tests, enabling immediate and low-cost access to laboratory results and providing quick turnaround on medical case transcripts. So far, no one is saving that much because the network is still new, he explained.

At Brigham & Women's, Glaser is projecting much larger savings from client/server — $10 million to $15 million a year. The savings exceeds the hospital's annual nontelecommunications IS budget of $4.7 million in operating expenses and $4 million in new equipment purchases.



"WE THINK CLIENT/SERVER IS ESSENTIAL. WE JUST DON'T SEE HOW WE CAN EFFECTIVELY MANAGE OUR BUSINESS AND MAINTAIN OUR LEVEL OF QUALITY WITHOUT IT."

JACK STEINMAN,
VICE PRESIDENT,
INFORMATION SERVICES,
AURORA HEALTH CARE, INC.,
MILWAUKEE

The estimate includes everything from redundant lab tests that will be eliminated to the computer system's ability to page a doctor when test results show that a patient's condition is life-threatening. The estimate also includes automatic surveillance within the client/server system, which was designed to prevent improper or unnecessary use of certain drugs.

For example, one of the medications monitored, called "human growth hormone," was so overprescribed that the hospital was able to sharply reduce its $750,000 annual bill for the substance. Doctors frequently prescribe the hormone for bad burn cases, car wreck victims and patients with major open wounds, but a hospital committee of doctors considered it to be of questionable value for speeding the healing of broken bones, according to Glaser.

"When you order the growth hormone, the computer asks you what you are using it for. If you aren't using it for one of the three approved uses, it denies the order," Glaser said. The savings: The hospital slashed $700,000 a year from its expenses for human growth hormone.

There have been savings on the administrative side at Brigham & Women's, too. "We shuffle a lot less paper, and the processes within the hospital are much better coordinated. Moving a patient from intensive care to a normal hospital care unit is an administrative task, but it affects where the pharmacy delivers medications and where the pulmonary people deliver tests," Glaser said.

Before the client/server system was installed, administrative coordination was handled "with a lot of phone calls, a lot of paging and a lot of people scurrying around, trying to do their best with incomplete or inaccurate information," he said.

Alexander is a Minneapolis-based journalist who reports on technology.

PHOTOGRAPHY BY GLEN HARTGIS/IMAGE STUDIOS

WHEN DATA IS NOT ENOUGH

TROPICANA PRODUCTS' 1993 YEAR-END PROMOtional strategy wasn't tasting quite right. So the $1.3 billion juice producer started sniffing around for a more effective campaign. But before it could put the squeeze on customers, the company needed better business intelligence on the impact different types of promotional campaigns might have on consumer buying habits.

Yet Tropicana's mainframe-based decision-support system plainly wasn't delivering that type of juicy information. "It wasn't that we were losing money," explained Steve Goodfriend, business development manager for the Eastern division of the Bradenton, Fla.-based fruit juice giant. "But it wasn't as much of a winner as we thought, and we weren't quite sure why."

One reason could have been that it often took days to gauge how effective a campaign had — or hadn't — been. And if a promotion had not been successful, time-consuming analysis translated into missed opportunities for both the juice maker and its retailers.

Time for a fresher way to run the numbers to develop a more effective campaign. Enter a multidimensional, client/server database management system that Tropicana had recently purchased from Cambridge, Mass.-based Kenan Technologies, Inc. The system was built to analyze purchasing patterns by extracting order and promotional campaign data residing on the mainframe.

Tropicana picked one retailer to test its approach. In a matter of three weeks, Goodfriend and crew were able to carefully scrutinize historical data on biweekly buying patterns over a three-year period at that retail chain's stores throughout Florida.

The result was one hell of a happy new year for Tropicana — and its retailer. With the client/server analysis as its guide, Tropicana trashed its 12-week, one-coupon-per-day campaign in January 1994 and substitut-

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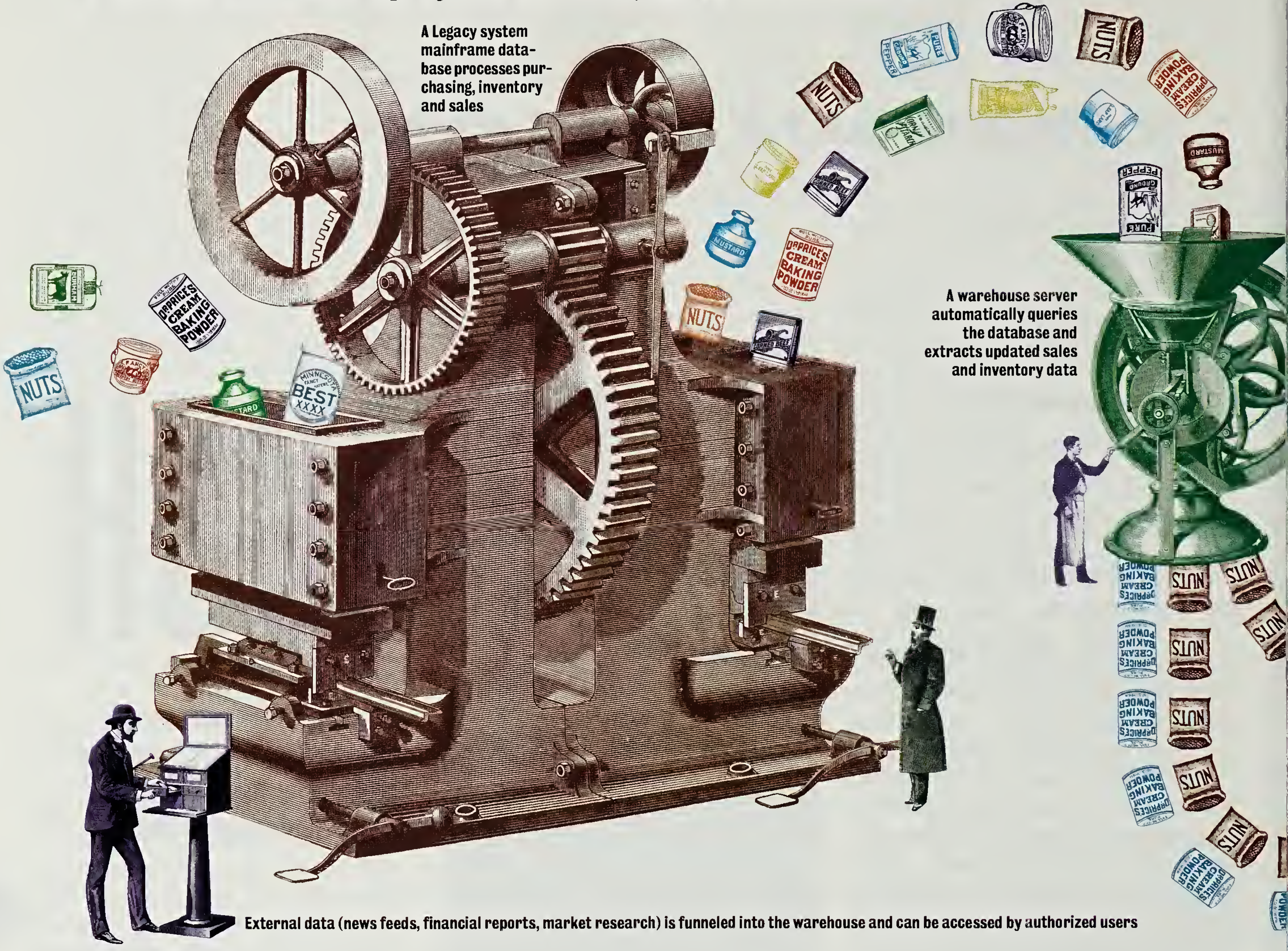
CLIENT/SERVER HELPS ORGANIZATIONS TRANSFORM RAW INFORMATION INTO A COMPETITIVE EDGE

BY WILLIE SCHATZ

ILLUSTRATION BY JOHN BAXTER/ACME DESIGN CO.

A Better Mousetrap

Many companies are building business intelligence systems using client/server technologies to gain a better handle on their operations. What follows is a theoretical example.



A Legacy system mainframe database processes purchasing, inventory and sales

A warehouse server automatically queries the database and extracts updated sales and inventory data

External data (news feeds, financial reports, market research) is funneled into the warehouse and can be accessed by authorized users

Continued from page 25

ed a two-week, three-time promotion during that time span. The change brought a 20% profit increase and a 33% revenue increase.

Even the grocery chain, which Goodfriend declined to identify, experienced a 22% profit increase due to increased juice sales.

FRESH INFORMATION

Fully juiced, Tropicana is currently using its newfangled approach at other chains across the U.S.

"It's part of the [company's] culture," Goodfriend said. "The client/server system did the analysis much more quickly and with greater accuracy, so we were much more confident in the results. We might have reached the same conclusion with our legacy system, although I can't even imagine how long it would have taken, but we certainly wouldn't have changed as quickly."

Or as smartly.

Enlightened organizations are tapping a variety of client/server technologies to aid and abet the gathering of business-critical data. Many companies are rigging up so-called "business intelligence systems" that enable PC users networked across the enterprise to access and analyze key sales, marketing and trends data.

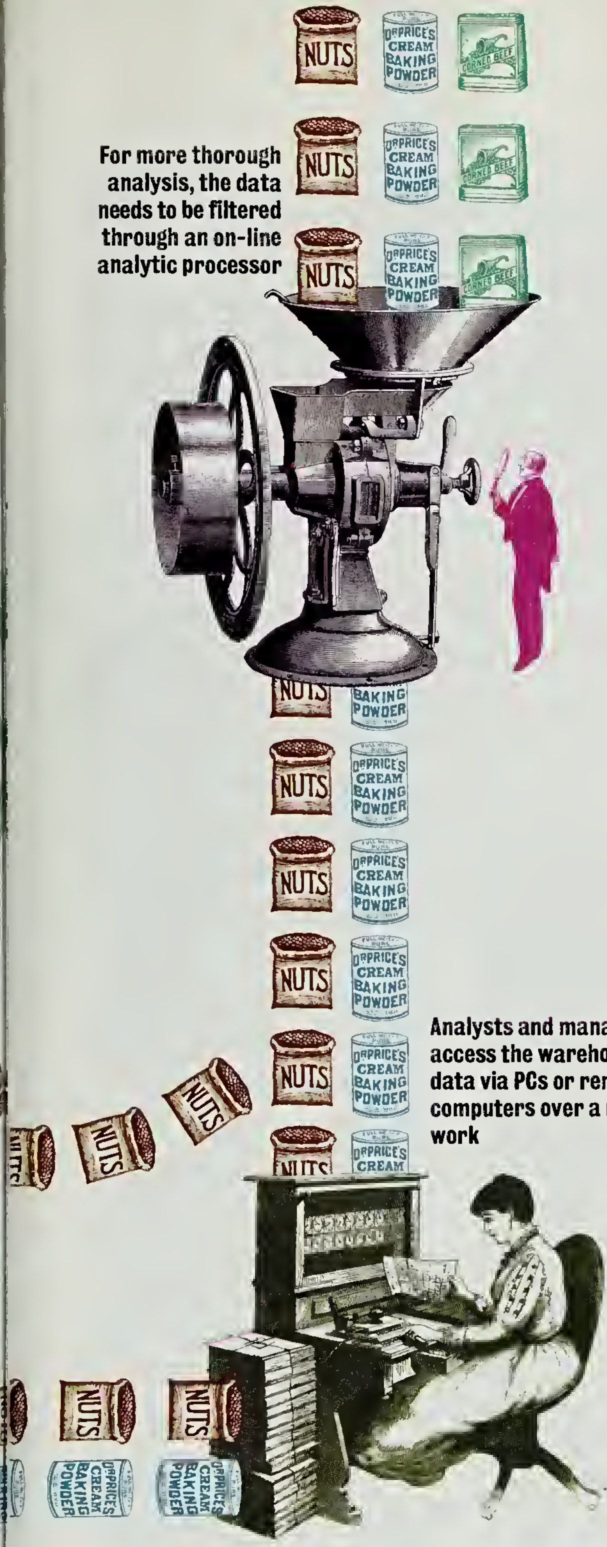
The tools of the trade vary according to the company and its installed base of technology. These systems often distribute intelligence, processing and data across a variety of platforms. For instance, data from mainframe production systems can be extracted via middleware to populate data warehouses, multidimensional and/or replicated distributed databases for further analysis and/or business modeling (see chart).

"For many business intelligence applications, client/server is an essential architectural component," said Howard Dresner, an analyst at Gartner Group, Inc. in Stamford, Conn. "Those applications are very complex, and clients aren't good at dealing with complex data relationships. You can't do things like predictive forecasting on the desktop."

Well, you can. But not with any rigorous applications requiring a lot of data. According to Dresner, you need powerful servers to handle greater data complexity.

Sophisticated business intelligence practitioners want to digest the complex data and create a model around it that explains the reality of the company's business, he said. Because the only 100% guarantee in business intelligence gathering is

CHART BY JOHN BAXTER/ACME DESIGN CO.


NUTS
DR PRICE'S CREAM BAKING POWDER

For more thorough analysis, the data needs to be filtered through an on-line analytic processor

Analysts and managers access the warehouse data via PCs or remote computers over a network

that companies will never get a 100% answer, all they're looking to do is shift the probabilities of success to their side, Dresner added.

Fellows Office Products, Inc. salesmen needed help stacking the deck in their favor. They heard rumblings that they weren't spending enough face time with their accounts, many of which were being courted by larger rivals.

Using Ottawa-based Cognos, Inc.'s 4GL Powerhouse, the $200 million Chicago company developed a quasi-client/server program that instantly generates sales reports of 50 North American territories from static host data. Immediate access to this type of data is helping Fellows sales fellows better service — and retain — customers.

"If the customer sees faster availability and more accurate information from us, the better position they'll be in to make a decision to buy our stuff," said Jeff Teitz, information systems manager.

Client/server business intelligence has helped boost the odds in MCI Communications Corp.'s favor, too. Two years ago, the $10 billion Washington-based telecommunications company instituted a corporate systems re-engineering program. Its Colorado Springs-based Systems Engineering Division was given the honor of executing the program for the company's operational systems.

MCI's mantra: Give its sales and marketing folks enough ammunition to help the company retain current customers and attract new ones by getting them to disconnect from AT&T Corp. and Sprint Corp.

Before moving to a client/server architecture, sales and marketing apostles would often wait days or weeks before one of 17 IBM ES/9000 mainframes responded to their query. That delay often left them feeling helpless, hopeless and furious. Meanwhile, some customers and prospects, tired of waiting for answers, hung up on MCI.

But by installing Sybase, Inc.'s System 10.2 relational database on Unix servers located at its four data centers in Sacramento, Calif., Rockville, Md., Perryman, Md., and North Royalton, Ohio, late last year, MCI has created a data warehouse that extracts all relevant sales and marketing information from the mainframe for easy access and manipulation. Using sophisticated front-end query tools, personnel on PCs anywhere across MCI's fully wired enterprise can now request data pertinent to closing a sale. Answers arrive back in minutes instead of in days.

The data warehouse is enabling MCI to gradually retire certain mainframe applications. And best of all, said Shelley Kooser, a systems engineer in the Systems Engineering Division, the client/server technique has taken the intelligence out of the application and put it into the data warehouse, where it's almost instantly available to thousands of users.

Is it helping MCI stay competitive? The answer, according to Kooser, is a resounding yes. Can that be proved? Perhaps. But Kooser declined to provide cause and effect documentation.

Cause and effect is clearly in play at H. E. Butt Grocery Co., a 160-store chain based in San Antonio. The grocer has replaced its mainframe-enforced guessing game about which products will move fastest from which shelves with the client/server comfort of knowing its managers have made the right choice.

Butt's 40,000 workers generated more than $4 billion in revenue in the fiscal year ended October 1994. Yet regardless of whether that ratio is good for the industry, management didn't believe that privately held Butt was kicking enough butt. So a year ago, top executives mandated a move to a client/server business intelligence system.

"Point-of-sale queries that took three to four weeks to answer with our legacy system now take minutes, if not seconds," raved Claude Danvers, Butt's director of database administration. That information is absolutely vital to the 40 category managers, each of whom administers approximately 10 industry categories such as beverages and screwdrivers. The managers receive the relevant field reports, massage them and then fire the sanitized versions back to members of the sales force.

THEY'VE COME A LONG WAY

That's not how it used to be. Butt's MVS production and Unix point-of-sale (POS) systems were unable to share information. Moreover, select few category managers even knew where and/or how to find POS data. And if they wanted help, they had to ask the IS department for assistance. If the users' timing was impeccable, their request would be honored. But they'd often be shut out, the innocent victims of terrible capacity planning.

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"We'd been capturing scanning data for a long time," Danvers explained. "But the competition was getting so fierce that the delays in responding to queries — when we could even do that because we just had to ignore many of them — were no longer acceptable. We had to manage our inventory in a timely fashion. Otherwise, we couldn't stay competitive with Wal-Mart, Kmart and the other superstores."

Butt's client/server coup began in January 1994 with the installation of a dual-processor, 200G-byte Hewlett-Packard Co. HP 9000. POS data flows into the MVS mainframe over the firm's wide-area network, where it's processed. The data is then downloaded to the HP server, where a Red Brick Systems, Inc. 80G-byte decision support DBMS resides.

Butt's category managers then analyze that data from networked Intel Corp. I486-based clones using customized software with graphical user interfaces designed by Butt and built by A. C. Neilsen Co. Because the data is all theirs, Butt's category managers can produce reports limited only by their imagination.

Asked for an example of those managers' creativity, Greg Fredericks, Butt's manager of decision-support systems, said emphatically that "we would never let that out because ... we don't want to tell our competitors how we're kicking their ass."

A smart answer? Probably, because business intelligence can be quickly rendered useless if competitors can easily and less expensively imitate the process — a reality all of these users can attest to. ◩

Schatz is a freelance writer based in Washington.

BLOOD, TOIL AND TEARS PAY OFF

The financial analysts and strategic marketers at Fidelity Investment Institutional Services (FIIS) crawled into a black hole every time they queried their dinosaur legacy system.

"With our mainframe-based DB2 database, those power users could forget about creating accurate sales forecasts," said Mark Parsons, systems manager at the investment giant's Boston headquarters. "It was taking at least 24 hours to respond to those queries. Eventually, they just stopped making those requests."

FIIS's Mark Parsons admits the client/server migration was much harder than he'd expected

So they did the next month's and next year's sales projections the old-fashioned way: manually.

But that was then. Now, in the client/server environment, which was turned on Jan. 31, the 50 analysts and marketers can compare the 1993 and 1994 sales of specific financial instruments and be sure they will receive a precise projection for 1995 — in only four hours.

"We had to put on users' desktops the ability to go after information in ways they hadn't been doing," Parsons said. "And we probably missed some business opportunities because we couldn't get the right information at the right time."

They blew their chances because the DB2 database couldn't cope with decision-support systems (DSS) and on-line transaction processing (OLTP) simultaneously. The new system is faster and smarter because Parsons and his team wisely decided to divide the DSS and OLTP functions.

OLTP is now handled in FIIS's Dallas data center by a four-CPU Sun Microsystems, Inc. SPARC 1000 server running Solaris 2.3 and Sybase 4.92. That configuration does the real heavy lifting, nightly crunching about 300M to 400M bytes, or about 40,000 daily transactions.

Production data is then sped to Boston via a fractional T1 wide-area network into another four-CPU SPARC 1000, where a Red Brick Systems database organizes the files for decision-support analysis.

This migration consumed more blood, tears, toil and sweat than Parsons had expected.

He admitted that although he saved a ton of money on hardware, he blew the budget for training and performance testing. But that rocky road hasn't caused a detour on his path to an all-client/server environment.

"We've had a pretty good experience with this," Parsons said. "But you better have one hell of a team together and be damn serious [about moving to client/server]. All kinds of issues come up that you never expected."

So far, though, the end has justified the means.

"I can't quantify our competitive edge yet, but I guarantee this system will give us one," Parsons said. "We'll have a much greater ability to target the businesses that are most profitable for us. And we'll be able to create goals that are truly intelligent."

PHOTOGRAPHY BY SETH RESNICK

Information vs. Data

BEFORE YOU GO OFF AND CREATE A DATA WAREHOUSE, KEEP IN MIND THAT IT INVOLVES HARD, COMPLEX WORK.

Data warehousing is beginning to emerge as a key silver bullet. Should you run out and implement a data warehouse for your organization? Is it just another fad, or will it fundamentally change the way companies do business and impact the bottom line?

I believe data warehousing can help organizations base their competitive advantage around a data-centric model. But unless a data warehouse is approached correctly, it will be of little use.

By definition, a data warehouse is a method of gathering data from different sources into a common model. Businesses benefit because they can more quickly analyze unanticipated events and respond appropriately.

For example, a phone company executive may be able to discover a series of residential phone customers who should convert to business service. By querying a data warehouse, the manager can target the 500 customers with bills higher than $400 a month. Most likely these are home businesses that by law should pay the higher business rate. This additional revenue will go right to the phone company's bottom line.

But before you go off and create a data warehouse, keep in mind that it involves hard, complex work. Your most important focus should be on the organizational and conceptual level: the corporate data model.

The problem organizations face today is that each department and each part of the business has a different definition for the same information. Therefore, one department might consider a local sales office to be the "customer," while another department might consider the corporate entity to be the customer. If the IS group brings these two data sources together into a warehouse, contradictory information and chaos will result.

So what should you do to plan a successful data warehousing strategy? First look at the definitions of the data elements you want to use. In essence, you are beginning to model the data that will define your warehouse and thus the way you want to conduct business.

Use this opportunity to get business units involved in the process. There is intrinsic value in taking a hard look at the rules the business follows. For example, how do you want to define a customer? What is an allowable discount under various circumstances? Starting out with this approach will let you then pour information into a common data source.

From this data source, business managers can learn more about how the business works and what unexpected combinations of events might trigger new opportunities.

Building a meaningful data warehouse is not always simple. Business units must participate and support the effort to ensure that the company is capturing the right information. Many organizations have old databases with valuable information they want to put into a data warehouse.

However, many of these databases are undocumented. There's no one around who remembers the business rules. If your organization does not have clear guidelines for running the business, these conflicts will show up in the data warehouse project.

So if a data warehouse is complex to establish, is it still worth the time and risk? Yes. Organizations have to be ready to look at unanticipated relationships among data items. They must be able to look beyond data to information and the value it provides to business.

Data warehousing, if you approach it with discipline, can turn the IS organization into a business partner for perhaps the first time. ◩

JUDITH HURWITZ

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PHOTOGRAPHY BY STEPHEN SHERMAN

THE PERFORMANCE CONUNDRUM

CAPACITY PLANNING, SYSTEMS MODELING AND BENCHMARKING REMAIN A MATTER OF CONCERN

Like nervous parents before a child's first performance, information systems managers across corporate America are on the edge of their seats, waiting to see how their latest prodigy will fare. The curtain on their new client/server systems is now being raised after months of nurturing in isolated test sites.

Previous client/server applications were, for the most part, underachievers. Their inability to scale without incapacitating performance problems, the difficulty in managing these new tools and the hidden labor costs that client/server creates did not exactly endear these first-generation attempts to the corporate family.

Reputations are riding on these second-generation applications' ability to perform as well as the legacy systems they are replacing or augmenting. The systems coming online are more critical to the operations of the downsized, streamlined corporation of the 1990s, and the costs of failure will extend beyond IS. But the worry is that while these new systems may have executed flawlessly in protected developmental enclaves, their success in the rough and tumble of a production environment remains to be proven.

The concerns over client/server systems' ability to perform up to snuff are not unfounded. Performance management and capacity planning tools — IS management staples in the mainframe environment for years — are virtually nonexistent for client/server systems. Even the few technology gurus with experience in this area acknowledge that 'capacity planning and performance modeling remain largely guesswork [CSJ, August 1994].

BY AVERY JENKINS

ILLUSTRATIONS BY ANDREW FAULKNER

Johnson Controls' Steve Linstead used load simulations on the company's workflow system to find its weak spots

Fortunately, there is help on the way. Vendors across the board, including developers of mainframe-class performance management tools, are marshaling their forces to produce similar products for the client/server environment. But users and consultants agree that in the short term, the managers of these systems are flying blind.

Running without performance management benefits is nothing new for Bob McLaughlin, senior technical analyst at Dauphin Data Systems, the IS subsidiary serving Loyal American Life Insurance Co. in Mobile, Ala. Dauphin has recently begun deploying a client/server claims workflow application that has helped reduce claims turnaround to about five days, he said. But keeping the performance in line with business requirements is something of an arcane art.

THE NET OF IT

Much of a client/server application's performance is network-dependent. In response, some organizations are setting up virtual LANs, which use packet switching and/or cell switching to enable a node on a portion of a WAN to access services or data from any other node. This approach, however, means unprecedented management complexity. *See story page 35.*

"We get these mystery situations where I can't tell you what happened, but I can fix it," he said. "Just this morning, people were saying, 'It's very slow.' I checked, and it was." Using the limited tools at his disposal for monitoring the firm's 16M-bit Token Ring LANs, McLaughlin said, "I was able to isolate it to one ring, but I couldn't tell what on the ring was causing the problem. I reset the ring, and fortunately that fixed the problem."

Bernard Domanski, a professor in the computer science department at the City University of New York, calls this approach "rules of thumb." Such rules "reflect accumulated knowledge and wisdom regarding commonly observed relationships," Domanski said, and while "rules of thumb are excellent for day-to-day operations of installations, [they] aren't much help in predicting hardware and software upgrading requirements."

For example, he explained, "They are useful in estimating limits but very limited when used to represent complex interrelationships, like the impact of upgrading a CPU."

Domanski and other experts say there are generally four ways to predict any system's performance:

- Statistical forecasting is based on the collection of performance data such as CPU, memory, disk and network use as well as information that can characterize the installation's workload. Using this historical data, you can predict future trends.
- Simulation is simply constructing a model of the system, then applying various types of loads against it to dis-

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PHOTOGRAPHY BY GLEN HARTGIS/IMAGE STUDIOS

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cover how the system behaves.

- Benchmarking is another technique that is being applied to client/server systems. Several companies and universities develop standard benchmark routines and apply them to various components of a system. Equipped with this knowledge, an analyst can make a rough approximation of how the hardware will perform in his environment.
- Queuing modeling is a methodology based on mathematical formulas that approximates the relationship between workloads and performance.

Of these methodologies, rough-and-ready simulations are a common way for companies to stay ahead of their performance problems.

PLANNING BOARD

Thinking of creating a client/server performance model? Here are some helpful hints from Professor Bernard Domanski at City University of New York.

- **Factor in client delay time (equal to workstation disk time plus workstation CPU time); network delay time (equal to packet transmission time plus time needed to get network access); and server delay time (which must include CPU and disk delay caused by multiple client requests).**
- **Each component must be modeled individually. The results are then combined into an overall performance model.**
- **There are two model types: Queuing models, which assume that increase in service time is an exponential function, are faster to execute and require less historical data. However, they presume that data arrival times are independent of previous events, an often invalid assumption in client/server. Simulation models, which recreate system events, provide a more accurate representation but require more data and take longer to execute.**

For example, Steve Linstead, research scientist at Johnson Controls in Glendale, Wis., said his firm is preparing to roll out a workflow automation system for purchase orders and inventory.

The client/server system automates the process from initiation and authorization of a purchase through shipment of the order to the vendor and verification of its receipt on the loading dock. But before the application's debut, the system was tested with a simulated workload to pinpoint the weak spots. "We did an initial test, and we found that the impact of that service is virtually nothing" on the network, Linstead said. "It was just a blip on the screen" of the 10Base-T network.

The tests, he said, showed that the application "is more server- and client-intensive than network-intensive." It was designed to keep network traffic at a minimum by using more desktop CPU, he added. For Johnson Controls, this was the most cost-effective approach. So to keep client/server applications performing up to snuff, the company must constantly upgrade its desktop computers to ensure that they can handle an ever-increasing computing load.

EXPECTATION MANAGEMENT

What the complexities of capacity planning and performance tuning, in their simplest form, come down to is keeping response time in tune with users' needs and expectations. And this is where most organizations need to start with their development process, said Doug McBride, former board member of the Computer Measurement Group and a program manager at Hewlett-Packard Co. "You need to set performance goals up front," he said, but "a lot of organizations don't embrace the concept of service-level management."

"Response time issues are essentially productivity issues," said Mark Friedman, a principal at On Demand Technology, a software developer in Naples, Fla. "If somebody is sitting at a workstation, and they are waiting and waiting, they don't like it very much." User requirements, then, become the objective for any performance tuning or capacity planning.

Sometimes, Friedman added, the simplest way to keep performance up to users' requirements is to manage users' expectations. Designers can "engineer around [performance limitations] at the user level," he said. For example, when an application is retrieving data from the server, "there's a way of telling the user about it so the user knows" that he will have to wait for the system to complete his request.

COMPLAINTS, COMPLAINTS

Randy Keefer, manager of operations and technical support at Chemical Bank in New York, said, "We know when the system is not performing well" because end users "are calling the help desk and complaining." Keefer said his performance problems revolve, to a large extent, around memory management on the clients and servers. "Surprisingly, we have not found the bottlenecks to be on the network layer," he said.

Keefer's division of Chemical Bank services the bank's mortgages. He has deployed a client/server system using IBM PS/2 machines on the desktop, Sybase, Inc. servers and Microsoft Corp. Visual Basic customized applications to manage an imaging-based automated workflow system. The system runs over a Token Ring network using Novell, Inc.'s network operating system.

On the server side, Keefer said he is voyaging forward, despite the absence of useful benchmarks, and trying to determine "how much memory you need to start up concurrent SQL processes." Through sheer trial and error, he has arrived at the ratio of two processors for every 200 users. "It's not scientific, but it's crudely efficient," he said.

On the client end, the Windows

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1. Using a scale of 1 to 5 with 5 being very useful and 1 being not very useful, please rate our coverage of:

- ☐ **A.** Technology trends
- ☐ **B.** Market analysis
- ☐ **C.** Client/server applications in vertical industries such as services, manufacturing, public sector
- ☐ **D.** Product reviews
- ☐ **E.** Product comparisons
- ☐ **F.** Well-known vendor personalities
- ☐ **G.** Vendor strategies
- ☐ **H.** User strategies

2. Please rate the following on a 1 to 5 scale, where 5 is the most important benefit and 1 is the least important benefit you obtain from *Computerworld Client/Server Journal*:

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- ☐ **C.** How Suite It Is?
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graphical user interface is presenting Keefer with memory management problems. "There should be enough memory out there," he said, but a commonly cited failure of Windows is its poor memory management. Keefer said he plans to move to Microsoft's Windows NT this year, which should alleviate his problems.

He added that he would like to "take some capacity planning methodology to the client/server environment," but he needs better tools to collect performance data. "There are tools out there, but they are not coming from a mainframe mentality," he said. "It's real-time data, and I want historical data."

And therein lies the rub, according to HP's McBride. "Only recently have we found measurement tools available on Unix platforms, and they are still being worked on in the Novell and NT environment," he said. McBride added that to predict the behavior of any system, you must begin by characterizing the workload and utilization of system resources. That data can then be used to build a customized model of system performance, allowing managers to change variables and see the outcomes.

Keefer, like other managers, said he is anxiously awaiting such tools. Right now, data collection "is rather crude," he said, "but we are working with a vendor in a beta test of one of their performance management products" in hopes that better data can be obtained.

But IS organizations that are willing to spend time keeping ahead of the demand curve are all too rare, McBride warned. "In the era of just-in-time MIPS," he said, "people look at the activity of capacity planning as something they won't do on a regular basis."

If they did, client/server's next generation of applications might live up to its "wunderkind" billing. ◪

Jenkins is a freelance writer based in Ansonia, Conn.

Schwab's Ron Welf uses a testing lab to ensure no application runs before it's ready

SCHWAB-SAVVY SIMULATION

Ron Welf, manager of performance and capacity planning at Charles Schwab & Co., is, like many other managers, pursuing the holy grail of IS: the paperless office.

Client/server systems are an important component of the San Francisco brokerage's Distributed Computing Environment technology mix ["Can DCE Deliver?", CSJ, February 1995]. "We want to make sure we've got it right" before new applications and systems are deployed throughout the company, Welf said.

Right now, Welf has between 800 and 1,500 users on his distributed systems, with another 5,000 users waiting in the wings. He is ensuring that the client/server applications will be capable of accommodating those users by first putting the system through its paces in his custom-designed testing facility. The test site is equipped with the same client and server hardware that Schwab has in the field — Sun Microsystems, Inc., HP and IBM RS/6000 workstations, to name a few — all interconnected through a network so the entire system can be modeled within a lab setting.

"When the application is in the prototyping stage, we put it in this environment, which looks as much like a production environment as we can get it," Welf said, "and then we load test it." Welf's test facility simulates the query volumes the application can expect to see in production, while it measures key parameters to establish how the system reacts to the new load. He also analyzes it to see whether interaction among applications creates any problems.

He said one of his biggest headaches has been to find ways to collect the data he needs from the system to create and validate his performance models.

Schwab is using HP's OpenView as a system management framework, but Welf needs more tools to go out and compile the data for him. "The thing that I have a problem with from a capacity planning point of view is that we are typically trying to do trending, and we spend a lot of time analyzing historical data," he said.

Welf said the biggest difference between mainframe and client/server capacity planning is that "more and more, we are looking at resource planning from an applications point of view. In the mainframe environment, you don't have to worry about any one application," allowing you to look at the aggregate application load. But that's not true in client/server, he said, where the load is highly application-dependent.

PHOTOGRAPHY BY KIM STRINGFELLOW

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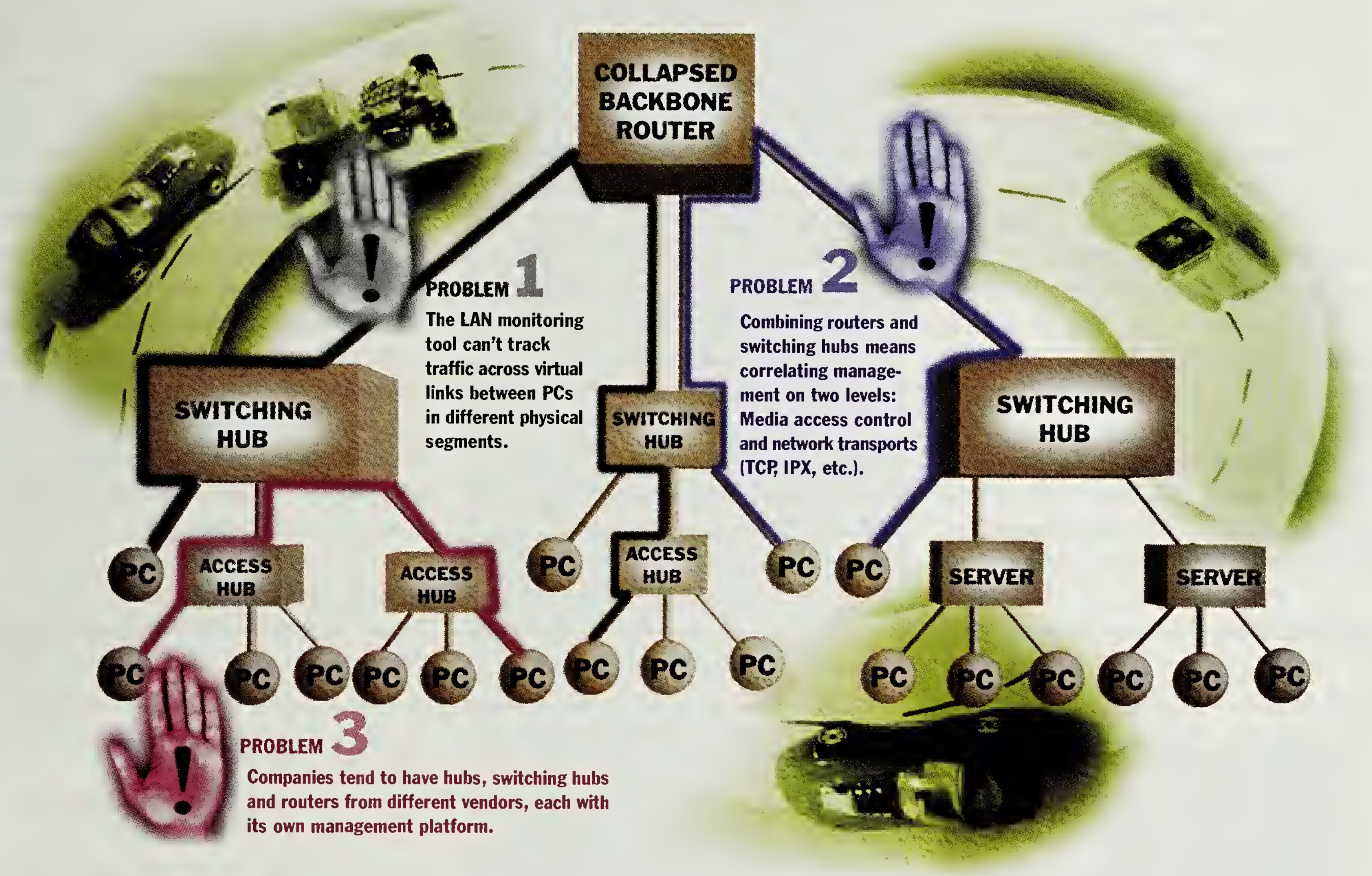
MANAGING THE VIRTUAL LAN

The decoupling of user and device groupings from physical networks is creating new management challenges



PROBLEM 1
The LAN monitoring tool can't track traffic across virtual links between PCs in different physical segments.

PROBLEM 2
Combining routers and switching hubs means correlating management on two levels: Media access control and network transports (TCP, IPX, etc.).

PROBLEM 3
Companies tend to have hubs, switching hubs and routers from different vendors, each with its own management platform.

USERS ARE CONTENDING WITH THE REALITY OF 'VIRTUAL' LANS

FIRING ON ALL CYLINDERS

BY ELISABETH HORWITT

Late this past January, a user on Holiday Inn Worldwide, Inc.'s network decided to install, on his own, a Hewlett-Packard Co. LaserJet printer on a network card configured for Apple Computer, Inc.'s AppleTalk. Once up and running, the printer promptly began broadcasting its presence to whatever AppleTalk stations were on the company's distributed computing network.

If the printer had been connected just to its own LAN — a Token Ring with 16M bit/sec. bandwidth — all would have been well. However, Holiday Inn uses switching hubs and routers to connect its 1,700 worldwide LAN sites into "one virtual community," where user devices can transmit anywhere they have access rights, said

Please turn to next page

CHART AND ILLUSTRATION BY ANDREW FAULKNER

Continued from page 35

Ed Boggs, senior network analyst at the Atlanta-based hotel chain.

As a result, the printer's broadcasts were traveling all over the world, causing traffic jams on local- and wide-area circuits where bandwidth was scarce, he added.

Once alerted to the problem, Boggs used a series of management tools to analyze the problem, identify the LAN location and the offending device and, finally, call up the user and request him to take the HP printer off-line.

If user and analyst feedback is any indication, Holiday Inn's handling of virtual LAN management is unusually effective and speedy.

NEW SOLUTION

"Virtual LANs" are the latest attempt by the network industry to help corporate customers keep pace with the exploding bandwidth demands of client/server installations. More powerful workstations, a growing user population and increasingly bandwidth-hungry applications such as multimedia are all contributing to this explosion.

Before virtual LANs came along, corporations tended to deal with a congested LAN by divvying it up into more and more, smaller and smaller segments, each supplying a limited group of users with dedicated 4M, 10M or 100M bit/sec. bandwidth, said Tom Nolle, president of Voorhees, N.J., consultancy CIMI Corp. Then companies would connect those segments via bridges and bridged routers that would pass along only packets addressed outside of a given LAN segment.

The problem with that setup, Nolle said, is that as the number of users and bandwidth-hungry applications continues to grow, corporations inevitably end up with "microsegmentation." That is, they keep carving LANs into smaller chunks, which in turn increases the need for cross-segment communications. Bridges, whose throughput is significantly lower than that of a LAN, become congested, and response time suffers.

PROBLEM SOLVERS

Products that promise to take much of the grunt work and complexity out of virtual LAN management are beginning to arrive. Among them are the following:

- **HEWLETT-PACKARD, 3COM AND CABLETRON are among the vendors who have installed Remote Monitoring-based software on their hubs to provide end-to-end analysis of traffic across virtual LANs.**
- **NEXT-GENERATION network management platforms, such as IBM's Karat, HP's Tornado and Sun Microsystems, Inc.'s Solstice, will provide software that takes alerts from different devices, correlates them and determines the source of the problem.**
- **NETWORK SIMULATION and modeling tools, such as Comnet III from CACI Products Co. in La Jolla, Calif., and Optimal Performance from Performance Networks, Inc. in Mountain View, Calif., take real-time data from network monitoring tools and simulate real network situations.**
- **NETWORK GENERAL plans to bring out by year's end a version of Sniffer that can analyze ATM cells and determine their source and destination.**

Thus the need for a new breed of LAN: packet-switching hubs and cell-switching Asynchronous Transfer Mode (ATM) switches that provide 800M bit/sec. to several gigabit/sec. of bandwidth for intersegment LAN traffic. Such products, from vendors such as Cabletron Systems, Inc., SynOptics Communications, Inc., 3Com Corp. and UB Networks, Inc., are priced from about $250 to $800 per port for switching hubs and thousands of dollars per port for ATM switches, Nolle said.

The switching hub's big plus is its ability to support virtual networks of users and devices that must communicate often and rapidly, independent of the actual physical structure of the network, Nolle said. For example, a company might set up a physical Ethernet segment on each of its floors, then use the switching hub's software to define cross-segment user groups that share the same media access control address and can therefore communicate quickly and efficiently over the hub's backplane. This is particularly important for supporting such up-and-coming technologies as workgroup computing and message-oriented and remote procedure call-based middleware, which involve users and applications communicating freely, irrespective of their network location.

COMPLEX FLEXIBILITY

However, the very configuration flexibility that virtual LANs offer has also resulted in unprecedented complexity when it comes to managing those same configurations.

"Our paradigm is changing" from a group of users sharing access to a single Ethernet or Token Ring LAN to virtual LANs that define user groups across multiple, interconnected physical LAN segments, said Chuck Rush, global networking manager at McDonald's Corp. "So there is no more congestion on the wire; congestion comes at the switched level. There is no more identifying workstation A and B having trouble on the same wire but A connected somehow over virtual link to B."

Furthermore, existing LAN monitoring tools such as Network General Corp.'s Sniffer were designed to monitor and analyze traffic on a single LAN segment, not across a virtual LAN link that comprises two LAN segments and at least one hub backplane in the middle.

Although vendors such as Network General are promising to address this gap soon, the current lack of management tools is making some virtual LAN users — and would-be users — nervous.

"If we don't have ATM network management in place when we have ATM, the concern is the same as always: What if it breaks?" Rush said. "In a large campus network, we can't afford that."

Further complicating the management equation are the routers a growing number of switching hubs support. These routers enable LAN administrators to add security firewalls and more intelligently handle traffic across segments. However, they add yet another management layer: LAN transport protocols such as TCP/IP and Novell, Inc.'s IPX.

In addition, network managers must consider that the source of a user's response time problem may not be the network at all but rather an overloaded server CPU or a quirky database application.

What all this means is that the only effective way to manage today's virtual LAN environments is piece by piece using multiple stand-alone tools. This can be both complex and time-consuming, according to LAN managers.

Take the case of Holiday Inn's errant printer. Physical network monitors on a variety of hubs reported congestion problems to the hotel chain's management platform, Cabletron's Spectrum. Boggs then used a Distributed Sniffer system to capture a sample of the packets and dissect them. The Sniffer reported that they were AppleTalk packets, then broke the packet down to its source. "I found a Mac address I'd never seen before," Boggs explained. "I broke the address apart, found it was an HP something, looked at the destination source and located the Token Ring" where the device was located.

The whole process took about an hour. Furthermore, many companies can't perform this level of analysis with Sniffer unless they, like Holiday Inn, maintain an ongoing log of the Macintosh addresses of devices throughout the network. This is not yet a common practice, according to a Network General spokesman.

And even at Holiday Inn, network managers would like to make their jobs a bit less complex and arduous.

"We have a pretty complicated network installation" that will get even more so when the company moves to ATM, Boggs said. "Yes, I would like to see something that automates and shortens the time it takes to do LAN management." ◪

Horwitt is a freelance writer based in Waban, Mass.

ELIMINATING GUESSWORK

Helix Health Systems is moving from a multilayered, fragmented approach to virtual LAN management to a much more integrated and, hopefully, effective strategy. According to Paul Brown, director of distributed computing, the Baltimore-based hospital chain has been having trouble "getting our arms around" a management system that includes the following:

- **On-demand software from Chipcom Corp. to monitor traffic going across Chipcom and IBM hubs.**
- **CiscoWorks to monitor the LAN-to-LAN and LAN-to-WAN traffic across Cisco Systems, Inc. routers.**
- **Network General Distributed Sniffer systems to analyze packets on a deeper level.**

These tools collect information about network traffic levels, congested bandwidth and port status. At least as crucial, however, is correlating that information with LAN administrators' knowledge of activity patterns to figure out why the problem is happening, Brown said.

For example, in one typical scenario, the hub and router traffic monitoring tools recently showed "major [network] utilization peaks Monday morning," Brown said. Sniffer-based analysis discovered that the biggest contributor to the traffic was electronic mail, calendaring and scheduling from WordPerfect, the Novell, Inc. Applications Group.

Human analysts' best guess as to the source of the spike was "that more and more users were on those applications; however, the same thing didn't happen Tuesday morning," Brown recalled.

Analysts next hypothesized that a pattern of Monday morning traffic spikes was caused by users checking their mail and calendars first thing after the weekend.

However, a repeat test the following Monday did not show the same problems, Brown reported. "We now attribute the problem to a slow WAN connection, which put extra traffic on the LAN backbone."

Helix expects to shortly eliminate much of the human gruntwork in the above process by installing IBM's NetView for AIX, along with Comnet III from CACI Products Co. in La Jolla, Calif. Comnet III can take traffic statistics pulled in by the network management platform's real-time monitoring tool and simulate network activity on multiple levels: Fiber Distributed Data Interface and 10Base-T segments and specific transport protocols such as IBM's SNA, Brown said. "This would let us capture [traffic data] over a period of time, plot it and then do a what-if scenario: If we added five more [user] machines and two servers, what will be our bandwidth requirements?"

Brown said he hopes to simulate the effects on network bandwidth of adding another hospital to the network.

Helix's Paul Brown is hoping for easier network management with new tools

PHOTOGRAPHY BY ROBERT BURKE

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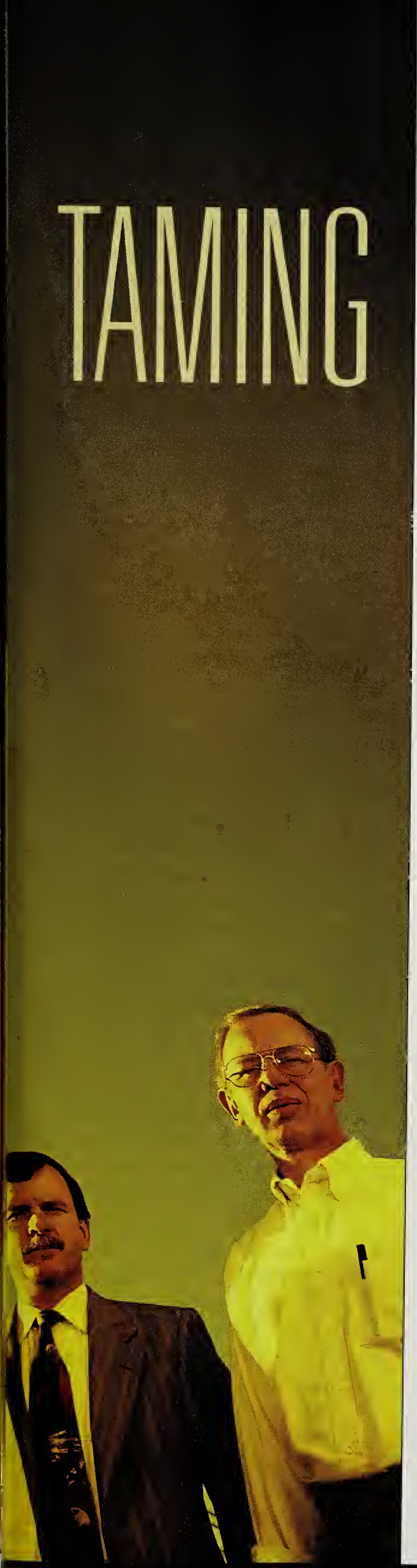
TEXAS INSTRUMENTS

(Left to right) United Airlines' project office manager Rich Gleason and the project management team: Lucia Kidd, Kyle Parsons, Dick Schlicht, Jim Sund, Ken Gates, Paul Noah, Tim Massal and Ken Davis. Not shown: Dana Roberts, project management team leader.

PHOTOGRAPHY BY WILLIAM MERCER MCLEOD



TAMING THE BEAST

NEW TOOLS AND TECHNIQUES PROMISE TO MAKE CLIENT/ SERVER DEVELOPMENT MORE MANAGEABLE

Successful management of an enterprisewide client/server project is like a good juggling act, in which a dexterous performer keeps diverse objects — say, eggs, roses and light bulbs — in motion and intact.

The complex nature of any large client/server project means its manager must be deft at balancing everything from planning, prelaunching and launching a project to building a project team and tracking builds and revisions. It also means managing people, budgets and the quality of code.

Fortunately, burdened project managers can seek new client/server-specific tools that are said to help coordinate user requirements with strict budgetary and scheduling demands. For instance, some tools can help managers match people skills with systems requirements, track project performance over time and against plan and help ensure that programs built meet specifications.

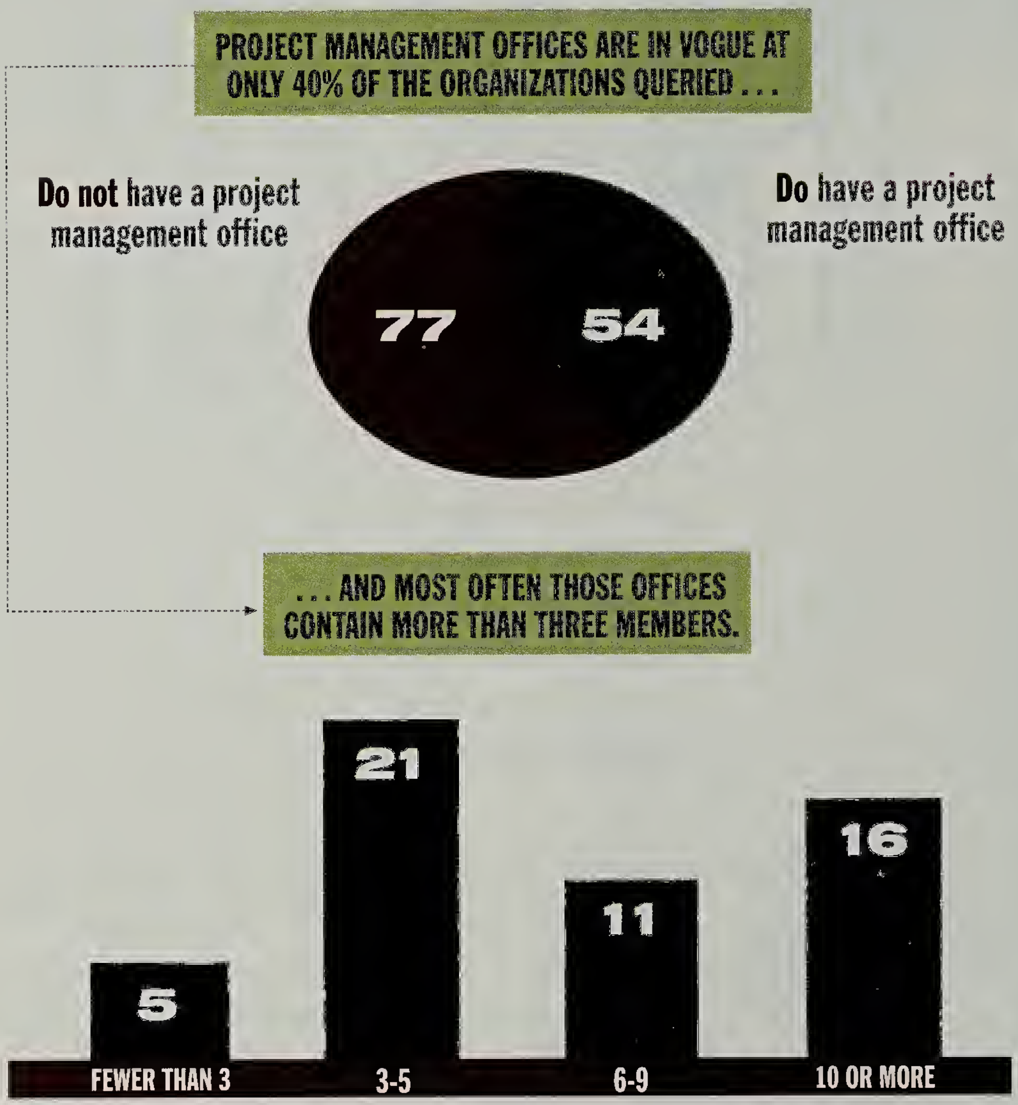
Clearly, however, good tools are only part of the formula,

Please turn to next page

BY CHERYL GERBER

CSJ EXCLUSIVE PROJECT MANAGEMENT SURVEY

NOT QUITE 'AU COURANT'



Survey Base: 132

PROJECT MANAGEMENT OFFICE TITLES CITED MOST OFTEN

Database administrator	37
Network analyst	31
Business analyst	28
Project manager/Director	25
Help desk coordinator	25
Development specialist	25

Survey base: 238

Source: Computerworld *Database Division*

Continued from page 41

client/server-savvy project managers say. More enlightened methods are needed to prevent project management jugglers from dropping their objects.

For instance, some organizations are creating project management centers to provide a central resource for managing the small, interactive development teams that are building many of today's enterprise-wide client/server applications (see charts above). Other organizations are mandating user involvement from project conception through execution. This, they say, improves the odds that the resulting applications will better meet business objectives.

However, if your organization hasn't come to these realizations, don't despair. Project management as a concept is not new; it predates the advent of client/server. Consequently, you can apply many past methods and experiences used to develop centralized systems to client/server projects.

DIFFERENT STROKES

Still, there are differences. "You don't design the entire project up front [as with centralized systems]; you design pieces of it at a time," said Linda Stephens, a project manager and director of systems development at Mazda of North America, Inc. in Flat Rock, Mich.

And no matter what, rest assured there will be muffs.

"In client/server, you make more mistakes more often," said Gopal Kapur, president of the Center for Project Management in San Ramon, Calif., which offers seminars on planning, estimating and organizing information systems projects. "Corporate executives must be actively involved in everything, including the training, and they must allow people to make mistakes."

He emphasized that companies must use spiral development and incremental delivery to control the scope of large client/server projects. Incremental delivery manages risk more effectively than the waterfall approach, which delivers the entire process with a big bang effect or builds multilayered functionality on top of itself without checking functions along the way.

"The project manager should parse the project into deliverable components that are implemented in the field on a progressive basis," Kapur said.

Mistakes often occur because of an acute lack of project management talent, IS managers said (see chart page 13). "Information systems departments used to look for the wrong skills in a project manager," Mazda's Stephens explained. "They looked for technical rather than project management skills. Yet it's not as easy to train a technician in project management skills as it is to train a good project manager in technical skills."

CENTRALIZED CONCEPT FLIES

Having the right project manager is key because in many organizations, the coordination of client/server projects needs to be centralized, while actual application development is decentralized. This requirement has given rise to the concept of a project management center, which acts as a quasi-help desk to advise and coordinate dispersed project teams.

United Airlines formed a separate project management office to bring consistency and standards to the process of injecting client/server into the airline's lifeblood aircraft engineering and maintenance systems. The four-year project is "the biggest thing that's ever been done at United," said Rich Gleason, project office manager.

United realized early on that it had to change its project management organizational structure from a command-and-control setup to more of an end-user-empowered, team-centered approach, especially for this project. "Part of the challenge of managing a major project is that it is composed of a lot of subprojects, so you have to roll it all up into one plan or you end up with islands of project management," Gleason explained.

Tools can help the juggling project manager keep his small teams in sync. To help guide United's project, for instance, Gleason relied on tools and methodology authored by New York-based Applied Business Technology Corp. The tools handle everything from scheduling to group reporting. Gleason used Applied Business Technology's Project Bridge Modeler for planning and estimating. The tools helped United build a system that was faster out of the chute (i.e., the process was easier to manage) and more in tune with users' needs, he said.

When Mazda began to implement its strategic plan to move off its legacy system into the world of client/server, Stephens brought method to what could have been madness by deploying LBMS, Inc.'s Process Engineering (PE) software to define the software development process and Systems Engineer (SE), a computer-aided software engineering tool, for design and analysis. The Houston software vendor's products helped Mazda create the metrics to set up the project plan, tasks and resources. Mazda then used PE's bidirectional import and export tools to exchange data with Microsoft Corp.'s Project, which the team used for scheduling, logging and allocating time to various tasks.

But project managers must be prudent in their use of tools, Stephens cautioned. "The PE method is not there to be rigid; it's there as a guideline. You should be able to fit your project in it," she said.

Most project managers agree that once users have been trained on the tools and the controls are in place, flexibility is the most important issue in enterprisewide client/server projects.

"When the work changes but nobody wants to change the project plan, then the plan ends up not reflecting reality. A project plan is like theoretical physics: It is a balancing act to keep the reality and the project plan in sync," said Steve Hefland, lead systems analyst who is managing a client/server-based advertising control system at American Express Travel Related Services in New York.

One way to synchronize a plan with reality is to involve users from the start and keep them involved in workgroups throughout the project's life cycle, Stephens said. "It works out better when part of the users' job is the project, as opposed to [being] in addition to" their jobs, she said.

Most project managers agree that management method may be more important than tools. Although they have come a long way, many software configuration management tools, for example, still need to be more intuitive and flexible.

"I don't think there's any project

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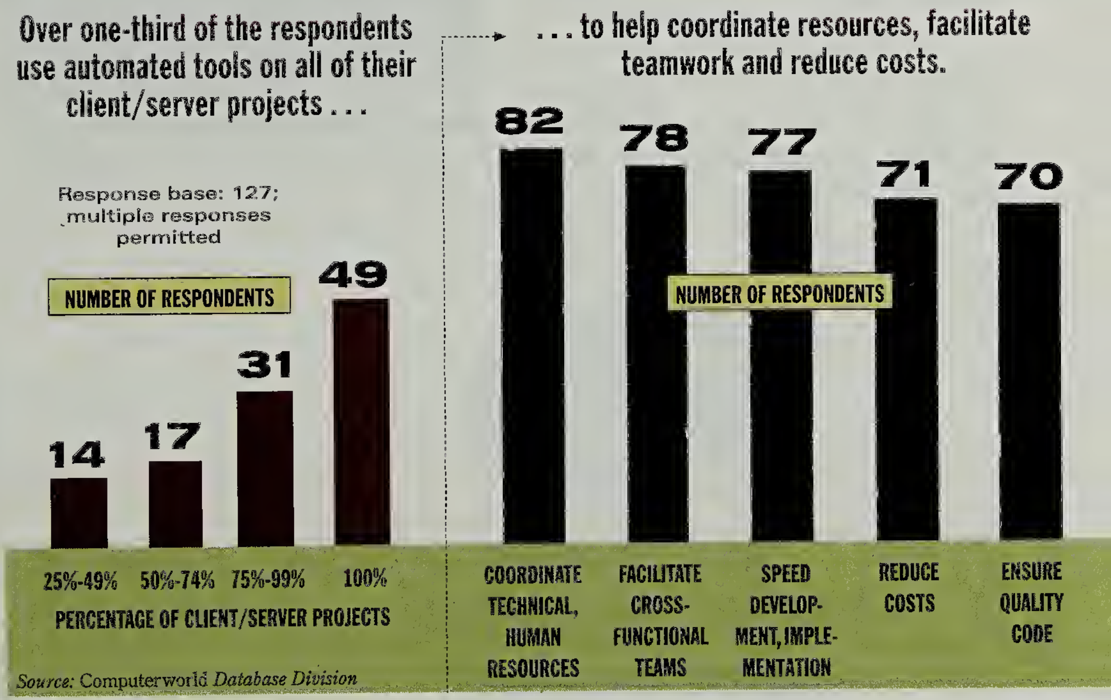
CSJ EXCLUSIVE PROJECT MANAGEMENT SURVEY

TOOLING AROUND



Source: Computerworld *Database Division*

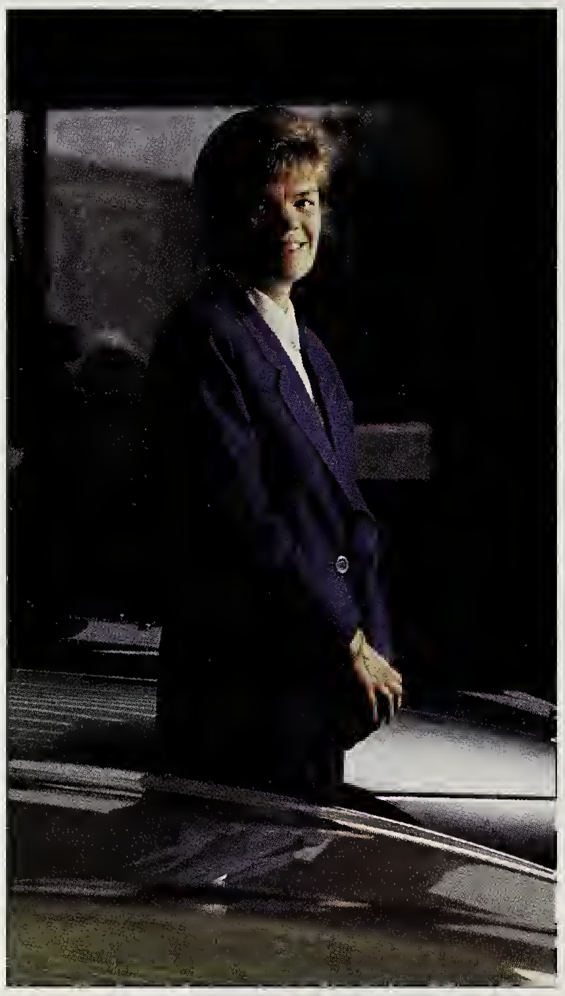
Continued from page 43

management software that you could just take out of the box and have it do what you want without a learning curve," American Express' Hefland said.

And as client/server matures, so does the need for more refined project management. A growing number of organizations are planning to put in place best practices and policies.

But hobbling those efforts is the clear lack of software development standards. "We do very little in the computer industry to show software developers how to code proactively to prevent bugs," acknowledged David Hsieh, LBMS's vice president of worldwide marketing.

"If you go to any other engineering world, such as a skyscraper builder, you'd find best practices, whereas we don't have that in software engineering. The fast pace means best practices never get a chance to be established," he said.



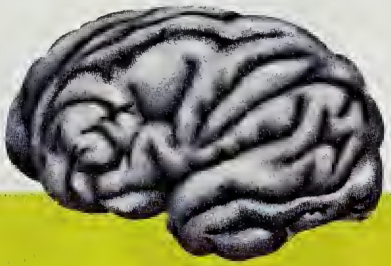
Mazda's Linda Stephens espouses the benefits of involving users in projects from the get-go

Moreover, rushed projects are doomed to wrestle with worst — not best — practices. "You must have due diligence on an idea to determine whether it should be launched. In client/server projects, people jump from minimal due diligence to minimal prelaunch to launch before they are ready," the Center for Project Management's Kapur said.

Although a lack of standards and the relative instability of client/server tools still plague the implementation process, many client/server project managers agree on this point: Sticking to good, classic project management maxims will likely make up for the short-lived instability of the tools.

Only then can the juggler be freed to be ringmaster. ◩

Gerber is a freelance writer based in San Francisco.



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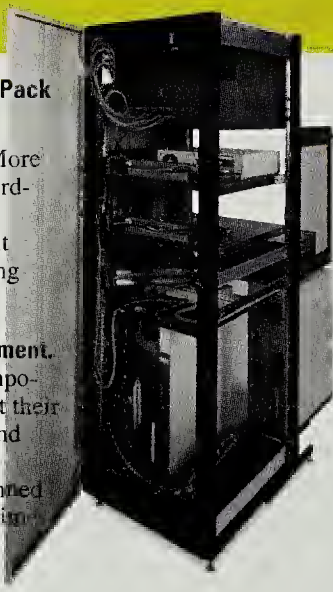

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PHOTOGRAPHY BY MICHELLE ANDONIAN

Database Deliverance

ODBC means freedom of choice to some, trouble to others

BY KIM S. NASH

Both client/server users and third-party vendors have debated, quite heatedly, whether Microsoft Corp.'s Open Database Connectivity (ODBC) specification is a slow, incompetent way to get PC applications talking to back-end databases.

Proponents say ODBC means freedom of choice for users shopping for client/server development tools, applications and databases. "If they can all talk to each other through ODBC, you don't have to worry as much about compatibility," said David Gottholm, president of Eclipse Technology, Inc., a Nashville-based vendor of data management utilities.

But detractors contend that ODBC, as another layer of software inserted between users and their databases, slows application performance too much to be useful. Drivers written specifically for a given database are more efficient and can use more of the target database's features, they say.

Elbow grease is how many corporate developers have worked around ODBC shortfalls. For example, ITT Residential Capital's mortgage department deployed ODBC drivers to connect Microsoft's Visual Basic development tool kit to Informix Software, Inc.'s On-Line relational database.

Sloth and unexplained unresponsiveness were among the biggest problems ITT Residential had, according to David Roquemore, application development manager at the San Diego firm. The glitches required custom code written directly to the ODBC driver.

Most veteran watchers say the success of ODBC depends on how it's implemented in a given driver. For example, while the first generation of ODBC drivers was largely slow and cumbersome, newer products coded to ODBC 2.0 are "a big improvement," said Michael Bragen, a consultant at Business Management Consulting in Lexington, Mass.

A third version of the specification, due by year's end, is expected to provide faster performance and enable users to take advantage of more features in target databases.

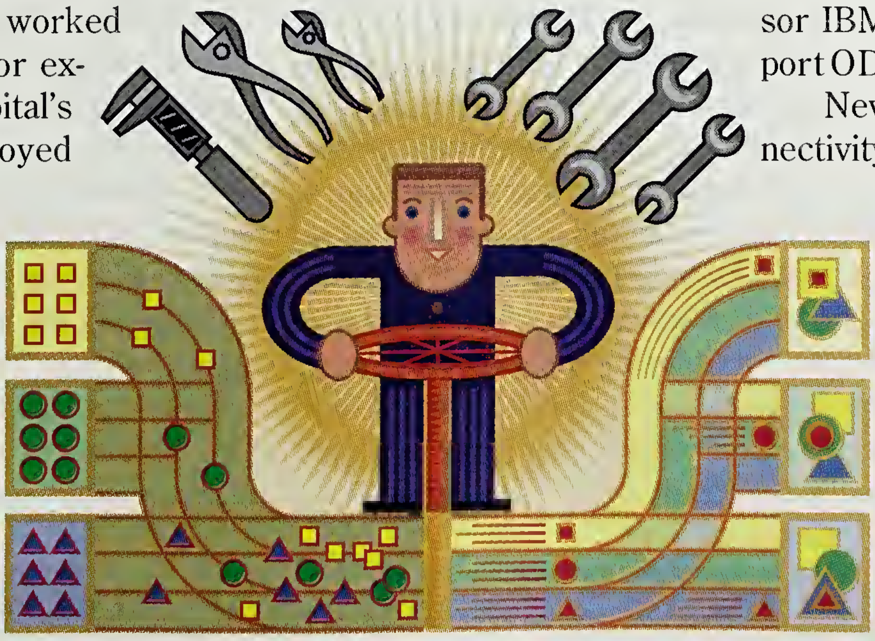
For instance, today's ODBC does not understand the concept of stored procedures "and so conducts them sloppily at best," said Rich Finkelstein, an analyst at Performance Computing, Inc. in Chicago. The new version will be tweaked to better execute stored procedures and understand different SQL dialects.

Perhaps more important, Release 3.0 will mark ODBC's return to its SQL Access Group roots. Microsoft recently agreed to adhere to the database connectivity rules established by the SQL Access Group, the vendor organization — now part of the X/Open Co. consortium — that originated the ODBC spec in 1991.

A looser Microsoft grip on ODBC should help ease the minds of information systems staffers worried that Microsoft may have too much control over the direction of the "standard." Indeed, Fresno Area Express, the transit department for Fresno, Calif., bypassed ODBC last year in favor of Borland International, Inc.'s Integrated Database Application Programming Interface, or IDAPI, in part because it didn't want to rely on Microsoft, said Michael Bonner, a programmer/analyst.

But IDAPI may be of little comfort to organizations seeking safety in numbers. It has met with little support among users, and even co-sponsor IBM recently said it would support ODBC in its next release of DB2.

Nevertheless, the database connectivity standards game may eventually end up as alphabet soup if corporate developers opt to write inherently faster native calls to access heterogeneous data from ubiquitous Windows desktops.



Nash is Computerworld's *senior editor, Databases, in Burlingame, Calif.*

ILLUSTRATION BY JEAN TUTTLE

HOW SUITE IT IS?

MICROSOFT'S BACKOFFICE SERVER BUNDLE ENTICES SOME USERS, TURNS OTHERS OFF

BY LYNDA RADOSEVICH

The grainy black-and-white magazine ad features a young boy gazing, one presumes, into a future full of opportunity. Business is the "engine" of society, the root of opportunity, the ad says, and Microsoft wants to provide the software that "drives" businesses forward.

All of the software. Exclusively. Every last little bit of it.

Now that Microsoft Corp. has conquered the client side of client/server with Windows and the Office desktop suite, it is launching a full frontal attack on the server side. Its evolving BackOffice suite — which contains SQL Server as a database, System Management Server (SMS) for resource management, SNA Server for mainframe connectivity, Microsoft Mail/Exchange for messaging and directory and a Windows NT server for file and print — represents Microsoft's boldest strike yet for client/server hegemony.

In exchange for buying all the major software pieces from Microsoft for their mission-critical applications, companies get discounted software, uniform development tools and the promise of gloriously easy integration.

Technically speaking, Microsoft's integration goals include remote procedure call technology for remotely accessing the database, messaging and management data; a common programming model using Object Linking and Embedding; Open Database Connectivity (ODBC) and Messaging Application Programming Interface; one-seat management; and single log-ons for end users.

It's an alluring offer, some information systems managers say, yet at the same time it gives them a case of back-to-the-future willies. The strategy is highly reminiscent of the integrated office applications concept that made the mainframe famous in the 1970s but was reassessed in the '80s and ultimately rejected by PC devotees in the '90s.

"One school of thought says it's integrated, easy and cost-effective," said Michael Goulde, a consultant at the Patricia Seybold Group in Boston. "The other school says, 'Here we are paying an arm and a leg to get locked in like we did by IBM.' It depends if you are an optimist or a pessimist."

Whether you're a pessimist or not, the Microsoft server suite makes no sense for many shops because it runs exclusively on Windows NT. While a growing number of Fortune 1,000 companies are moving to NT — as many as 32%, according to Dataquest, Inc. in San Jose, Calif. — most are using multiple client/server operating systems.

"Realistically, when you're buying the suite with NT, you're buying into Microsoft. If someone is concerned about portability and flexibility, they shouldn't buy this suite," said Scott Winkler, vice president of operating systems research at Gartner Group, Inc. in Stamford, Conn.

But in the hands of an optimist, that same

restricted focus becomes an advantage. Microsoft can tune its server applications for NT and related application programming interfaces (API) rather than spread them too thin across many platforms. In theory, that tuning makes it easier for developers to create customized applications that use the various BackOffice services.

For instance, Microsoft's SQL95 will be optimized so that ODBC is the best method for accessing data on a SQL server, said BackOffice product manager Todd Warren. Such tightly woven functionality will become even more evident as BackOffice evolves.

Neat idea, but for the most part, BackOffice is still not much more than a marketing bundle. "Call me back when the products are ready," said a systems analyst at a large Seattle-based insurance company who requested anonymity.

OK, so BackOffice might not be fully baked yet, Microsoft admits, but look what it will do in time. Originally, Office (Word, Excel, PowerPoint, etc.) didn't offer much in the way of integration. Now, years later, users can link live charts to spreadsheet tables in the middle of word processing documents that are routed by electronic mail. But that level of integration isn't there on the server side yet, and Microsoft won't say when it will deliver.

Even if it does deliver the goods, one of the main arguments against desktop suites is that customers don't desire or need the whole package. "Having something called a suite is irrelevant unless they have the products you want," said Larry Shaw, PC coordinator at Seattle-based retailer Nordstrom, Inc. Nordstrom has 135 Windows NT servers, but only a small percentage would ever need anything but NT on them. Most are doing only file and print services. Only 25 of 135 servers are running Microsoft's SQL, and mainly remote servers run SMS. "With the BackOffice suite, a lot of the parts you wouldn't want for every server," Shaw explained.

Other shops say they prefer a best-of-breed approach to server software and that the BackOffice pieces are not all up to snuff. Microsoft's SQL database server, for example, cannot handle the high data volumes or match the SQL query response time of Oracle Corp.'s and Sybase, Inc.'s respective databas-

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ILLUSTRATIONS BY MATTHEW WAWIORKA

San Bernadino's Timothy Meyer optimized his Microsoft Office front end with the server suite

Continued from page 47

es, database veterans said.

Also lacking is a complete set of management tools. SMS handles software distribution and configuration management, but it doesn't have the problem management, performance tuning and other enterprise management schemes that Hewlett-Packard Co.'s OpenView has, Gartner Group's Winkler said.

Meanwhile, the messaging component, Microsoft Mail 3.2A, is dated technology, and Microsoft has yet to deliver Exchange, its delayed client/server workflow/messaging product. These shortcomings could keep BackOffice out of the running for some time. "Today, I'm going on a feature-by-feature, server-by-server basis. And I expect to do that for the next year," Nordstrom's Shaw said.

Then why should you consider server suites? In some cases, the benefits may be considerable. Timothy Meyer, a systems analyst for San Bernadino County Public Works in San Bernadino, Calif., said choosing a back end from Microsoft ensures compatibility with a Microsoft desktop. Prior to moving 200 employees off character-based office automation software, Meyer spent a year looking at Windows desktop suites. The workers preferred Microsoft Office. So assuring them of the best and easiest access to back-end data is a good way to optimize the $30,000 the county spent in retraining.

"A lot of people pick the server, then try to find what will run on it. We took the reverse direction," he said.

A single-vendor server suite can also address some of the integration and support agonies inherent in multivendor systems. Two years ago, Kevin McKinney, an IS manager at battery maker Duracell, Inc., tried to install Novell's NetWare SAA, a software module that lets LAN users access a mainframe and an IBM AS/400. McKinney and his team at Duracell USA's manufacturing division in Lancaster, S.C., had problems getting the module to work with NetWare and Windows.

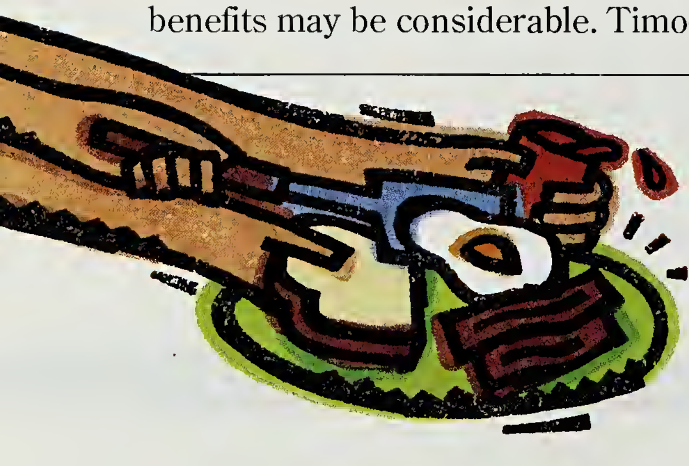
It finally worked, but only after McKinney had spent three weeks on the phone with support people and burned through roughly $5,000 worth of employees' time. "I really think that a suite approach would have helped here because the one vendor would have tried the pieces together, put out release notes and had the technical support to help," McKinney said.

By all accounts, McKinney is not alone in his experience. So experts contend that Microsoft's competitors will soon begin digging for server suite gold. Companies such as Novell, Oracle, Sun Microsystems, Inc. and perhaps IBM are expected to either partner or wade into one another's traditional areas of strength to offer integrated server components.

For instance, the week after Microsoft outlined its BackOffice strategy in September 1994, Lotus Development Corp. and Oracle signed a pact to integrate Lotus' Notes communications software with Oracle databases.

But until those competitors are ready with integrated products, the alternative is piecing together components. Technology partnerships such as Lotus and Oracle's may provide suite-style integration with best-of-breed components, but how hardy are those bonds?

"It could be successful, but each company has its own agenda, and there's going to come a time when agendas override their ability to work together. We already saw that with



FOR ONE SERVER AND 100 CLIENT LICENSES, BACKOFFICE COSTS $21,799 — CONSIDERABLY LESS THAN THE $28,725 TO LICENSE EACH OF THE FIVE COMPONENTS INDIVIDUALLY.

PHOTOGRAPHY BY LARA JO REGAN/SABA

Microsoft and IBM," Meyer said.

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Relying on systems integrators to link the pieces is another alternative. The job could be made much easier with the long-awaited emergence of open systems standards such as Spec 1170.

Back to the future, Microsoft has big plans for integrating server applications by tying them more tightly to NT. For instance, Exchange, which is expected to ship by year's end, will share a single set of network and E-mail user accounts with NT. Today, those users' accounts are separate.

Also, Exchange's public folder and replication services can be used with SQL Server data to give users the same wide-area group access to information they get with Lotus Notes. Moreover, Exchange will provide the messaging engine for SMS's software inventory and updates.

Further out, Microsoft plans to build more of the server applications' common services directly into Cairo, its server operating system (expected in 1996) that will store information as objects rather than files. Once information becomes object-oriented, the difference between structured database information and unstructured information such as E-mail messages begins to blur.

Microsoft has said it plans to build basic storage and retrieval capabilities into Cairo for both kinds of data, and users will have a standard computing architecture for what's now thought of as separate database and messaging applications.

Then, users may *really* be locked into Microsoft, much like they once were with IBM.

Those against the idea point to the mainframe's demise and how server suites go against the grain of client/server—i.e., the construction of a highly flexible application architecture using mixed-and-matched components. But those in favor think this is client/server's future. ◪

Radosevich is a freelance writer based in Belmont, Mass.

COMPUTERWORLD CLIENT/SERVER JOURNAL
WHERE DISTRIBUTED COMPUTING MEETS BUSINESS OBJECTIVES

1995 Editorial Calendar

Issue Date	Ad Close	Editorial Feature	Show Distribution	Ad Readership Study
June 1	April 12	**Vertical Market Focus:** Retail **Section Feature:** Product Focus on Development Tools	**Sun World,** May 22-25, San Francisco **Mobile World,** June 6-8, Dallas **Int'l DB2 Users Group,** June 11-15, Orlando, FL **Client/Server World,** June 13-15, Boston **PC Expo,** June 20-22, New York City **Enterprise Computing,** Aug. 1-3, Chicago	Harvey Study
Aug. 1	June 28	**Vertical Market Focus:** Insurance **Section Feature:** Product Focus on Networking	**Object World,** Aug. 15-17, San Francisco **Interop + Networld,** Sept. 25-29, Atlanta **Unix Expo,** Sept. 26-28, New York City	Harvey Study
Oct. 1	Aug. 23	**Vertical Market Focus:** Transportation **Section Feature:** Product Focus on Database Tools	**SIM Fall Conference,** Oct. 22-25, Orlando, FL **Software Developers Conference,** Oct. 3-7, Washington, D.C.	Harvey Study
Nov. 1	Sept. 27	**Vertical Market Focus:** Brokerage **Section Feature:** Product Focus on Development Tools	**Comdex Fall,** Nov. 13-17, Las Vegas **Client/Server World,** Dec. 5-7, Chicago **DB Expo,** Dec. 5-7, New York City	Harvey Study

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CASE STUDY UNIFI, INC.

Laying Down the Pattern

PART 2

What follows is the second installment in a series that examines Unifi, Inc.'s transition to enterprise, client/server computing. The $1.4 billion Greensboro, N.C., textile manufacturer has spent the past five months reevaluating its business processes and underlying information technology. This process was driven by a cross-section of key employees throughout the organization. Their input was critical to crafting a re-engineering blueprint that will be used to build a distributed computing infrastructure to support Unifi's expanding global presence.

As spring approaches, the spirit of rebirth permeates Unifi, Inc. Its business process re-engineering plan is now complete, and an office automation network is up and running, giving users a preliminary taste of graphical client/server computing. So, how are things going?

"Everything's gone extremely well. At this time, enthusiasm is increasing," said Ralph Mayes, Unifi's chief information officer. "Part of it is getting people — and their best ideas — involved. They're beginning to see a common vision for going forward and see themselves as part of an integrated enterprise."

Key to the re-engineering plan was the collective insight of a cross-section of some 300 Unifi employees, from high-level executives to midlevel divisional managers and functional staffers. "We brought people together who never worked together at all from different divisions that operated independently," Mayes recalled.

Together the group confirmed the executive vision of Unifi as a multinational, multiproduct operation. That helped Mayes' re-engineering team, aided by Ernst & Young consultants, create a model that distilled standard business practices across Unifi's nylon, textured polyester and spun cotton product lines as well as its international operations.

"We reduced our operations to 31 major processes," Mayes said. "We were looking for standardization and consistency, which could allow us to adopt packaged solutions to support all of our operations."

From there a team of some 15 "key owners" of the divisional operations viewed all of the collected data and endorsed the business practices chosen by the re-engineering team. The same middle management group then intensively reviewed the business model to see what practices could be improved.

"Three hundred and fifty different improvement opportunities were identified," Mayes said. "From small things, such as minor deficiencies of our current systems, to bigger issues, such as we don't have a system here or the appropriate business policies."

Unifi then inventoried every piece of technology it owned or leased, from hardware and software to communications gear. Mapping the technology base to the new business process model showed Mayes what he needed to build a more appropriate distributed infrastructure. Wrapping up the blueprint phase, his group defined an enterprise system model and infrastructure required to transform Unifi's distributed computing dream into reality.

Unifi's executive steering committee was expected to sign off on the estimated $10 million project early last month, although technology choices won't be finalized until midsummer. "We expect to go into the selection stage with a pretty targeted short list of partners," Mayes said.

Though it's premature to say what the architecture will look like, it will most likely revolve around a mix of new integrated packages and ex-

Technology choices won't be finalized until midsummer.

BY ALAN ALPER

isting bundled and newly crafted homegrown applications that would be accessed by Windows-based PCs over a TCP/IP wide-area network, Mayes said. (Though there will be some pockets of Token Ring, Ethernet will be the local-area standard.)

"We expect packaged solutions to meet 80% of our existing portfolio of needs; 10% of what we have [installed] will probably survive; another 10% will have to be custom-developed from scratch," he explained.

Major remote hub operations will be connected via T1, while communication links will be upgraded to 56K-bit lines, Mayes said.

The vestiges of the past — 10 disconnected IBM AS/400s whose bundled applications handle a variety of business functions, from accounting to logistics planning and inventory management — will definitely be absorbed into the evolving client/server environment. "We will have multiple [servers] on the network," Mayes said. "It will be years before we migrate away from the current AS/400 applications."

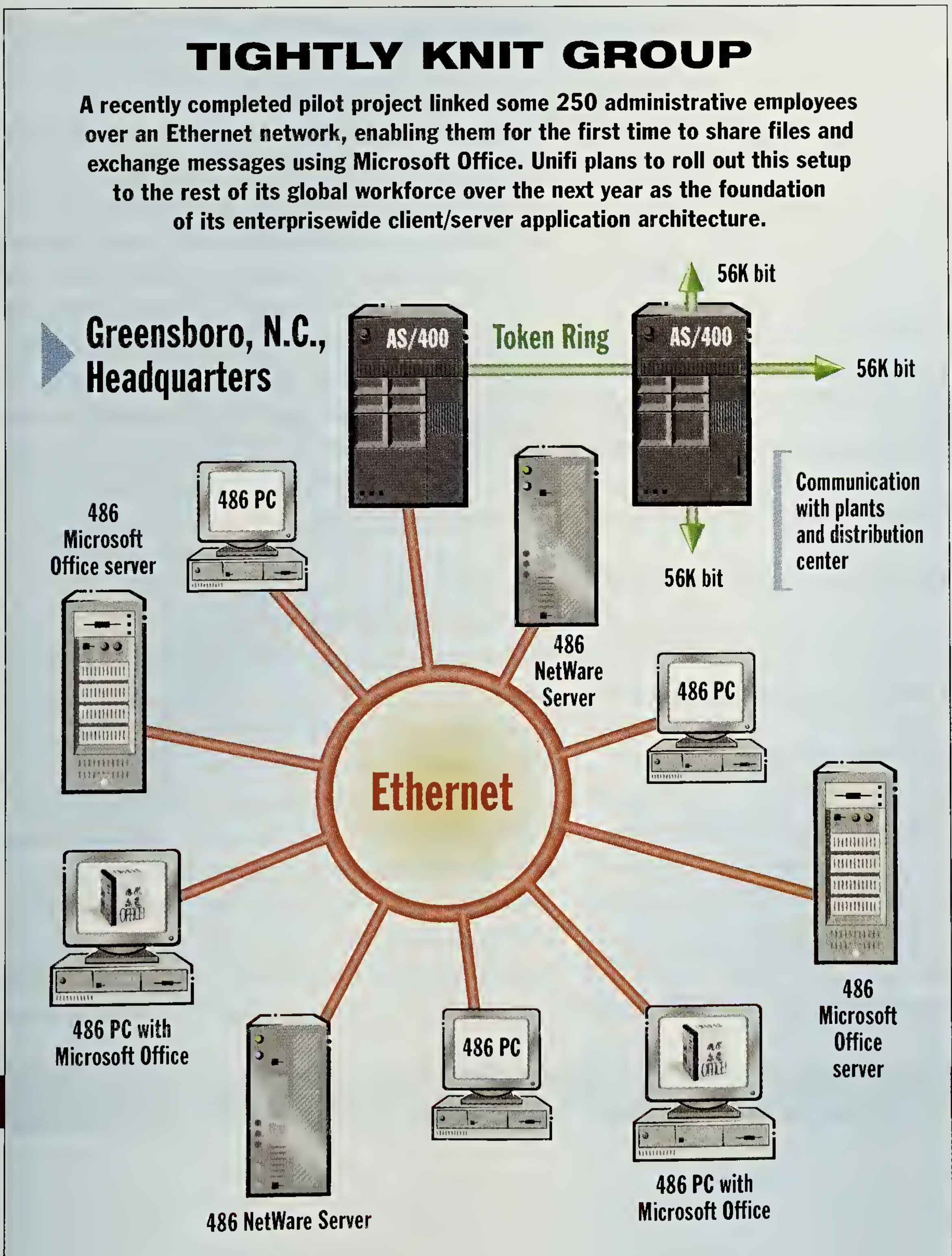
But Mayes is not waiting for the network infrastructure to congeal. Unifi's information systems group recently delivered an office automation network, built around Microsoft Corp.'s Microsoft Office, that enables some 250 administrative workers to share files and electronic mail.

Out went a hodgepodge of antiquated 8088 PCs; in came Intel Corp. I486, 66-MHz machines with 12M bytes of RAM. Windows is the desktop operating system, but Unifi is also testing Microsoft's NT, Mayes said.

Mayes has eased the transition to the new way of working by making users crave cross-functional, client/server systems. He gave them office automation packages, for example, that enable them to be more productive. "People like the look and feel [of Windows] and get hooked on using applications that use it," he said. ◪

Alper is the editor of Computerworld Client/Server Journal.

> **"We reduced our operations to 31 major processes. We were looking for standardization and consistency, which could allow us to adopt packaged solutions to support all of our operations."**
>
> **RALPH MAYES,**
> **CIO, UNIFI**



TIGHTLY KNIT GROUP

A recently completed pilot project linked some 250 administrative employees over an Ethernet network, enabling them for the first time to share files and exchange messages using Microsoft Office. Unifi plans to roll out this setup to the rest of its global workforce over the next year as the foundation of its enterprisewide client/server application architecture.

Greensboro, N.C., Headquarters
AS/400
Token Ring
AS/400
56K bit
56K bit
56K bit
Communication with plants and distribution center
486 Microsoft Office server
486 PC
486 NetWare Server
486 PC
Ethernet
486 PC with Microsoft Office
486 NetWare Server
486 PC
486 PC with Microsoft Office
486 Microsoft Office server

Unifi is a 24-year-old maker of textured polyester and nylon yarns; natural and packaged dyed, spun yarns; covered elastomeric yarns; and twisted yarns. The 6,000-employee firm exports to over 30 countries from 28 domestic plants and to more than 20 European countries from its plant in Ireland.

PHOTOGRAPHY BY WILLIAM MCINTYRE; CHART BY NEIL PINCHIN

D&B SOFTWARE'S MISSION: CONVERT MANY LOYAL MAINFRAME CUSTOMERS AND NEW DISCIPLES TO CLIENT/SERVER

A WORK IN PROGRESS

Not everyone would want to be R. Douglas MacIntyre right now. In mid-1994, the 43-year-old executive took over as top boss at Dun & Bradstreet Software in Atlanta, and there are certainly easier jobs. While D&B Software has been a major force in the software industry, it has yet to score big in the client/server arena. International Data Corp., for example, claims that D&B Software grabbed about 2% of the client/server business applications market last year. Dun & Bradstreet Corp.'s software division, of which D&B Software makes up the lion's share, had revenue of $406 million in 1994. D&B Software has nearly 600 client/server installations and 10,000 mainframe customers. In an interview with *Client/Server Journal*, MacIntyre spelled out his ideas for a client/server turnaround.

INTERVIEW

BY ROSEMARY CAFASSO

CSJ D&B Software has been criticized for delays in delivering client/server products and for a lack of marketing savvy. What changes will customers see here?

MACINTYRE Well, in the six months that I've been here, we haven't missed a date. This is a new company now. We said we would deliver Release 3 [of SmartStream, the company's line of client/server applications] in November [1994], and we did. We are instilling discipline throughout the company.

CSJ What's going to be visible to the customer?

MACINTYRE Great marketing starts with a superior product, and my focus has been on making sure we had a superior product. [The focus is on] SmartStream and Smartpath, the migration product. Our advisory council has really encouraged us to redouble our efforts in interconnectivity with the enterprise. I want our products to stand alone as the premier products for the larger, more sophisticated enterprises.

CSJ Is that a provable point?

MACINTYRE Every supplier has advantages. If a customer has bought the Oracle database religion, they tend to buy Oracle applications. PeopleSoft has an advantage: An installed human resources customer would be more likely to buy their financials. What we have as a potential advantage [is] our global reach. We are in 50 countries, we have 10,000 customers, and we have a positive reputation.

CSJ Is that unique, though?

MACINTYRE Against PeopleSoft, absolutely. Against Oracle, we have greater applications expertise in our global markets. Against SAP, it depends on the kind of customer.

The companies that tend to prefer SAP [are looking for] a more comfortable transition than going from a mainframe system to SmartStream. [SmartStream has a base platform that includes workflow technology and a series of applications that sit on top of this core software. These include decision support tools, financials, human resources, manufacturing and distribution applications.]

SmartStream is a total discontinuity because it is pure client/server. Developed from the ground up, workflow is embedded in everything. [SAP's] R/3 is much more akin to a mainframe system. The truth is, most companies are talking about re-engineering, but most companies don't really want radical change. SmartStream is a radical change.

CSJ But if most companies don't want radical change, wouldn't that limit you?

MACINTYRE Well, my bet is the pendulum is going to swing toward true distributed processing. If the pendulum moves toward the architecture of SmartStream, it will serve us well. If it doesn't, then we will have a relatively small market.

CSJ SAP can produce customer references making worldwide commitments to R/3, whereas D&B Software typically shows up in little pockets of companies. How are you going to deal with this and turn this around?

MACINTYRE Well, I am not going to try to turn that around. Our expertise is at the business system level. What we want to do is focus on business information systems.... We only really came out with our product line in November. [Pieces of SmartStream have been shipping for more than a year. D&B Software then rounded out the product line in November 1994 by adding manufacturing and distribution applications and upgrading the financials.] The chief information officer could not make a commitment to us before. So now we are proving ourselves out.

CSJ Has the company's Sybase-only database support been a problem?

MACINTYRE No, it's a missed opportunity. On the other side, when the customer is interested in the Sybase database, we have a real competitive advantage. As we get into the mainstream market, customers are much less forgiving, and they really want good implementations. I would rather do [the scheduled Oracle version of SmartStream] in 1996 right than in 1995 wrong.

D&B Software's R. Douglas MacIntyre: 'We are the best at world-class, global, sophisticated enterprises, and I will be damned if I am going to be distracted to try to go down market'

CSJ Do you see any point in having a lower-end and higher-end SmartStream?

MACINTYRE I see a very good point to not do that. We are the best at world-class, global, sophisticated enterprises, and I will be damned if I am going to be distracted to try to go down market. Other vendors are trying to capitalize on the [Microsoft Corp.] NT fever to go down market and work with smaller, less demanding customers. We are going to focus on being the very best that we can be for the larger, more sophisticated enterprises. Once we get that accomplished and establish our leadership in that market, then we will look at where else to go.

CSJ But by the time you make a decision to go to the next phase, there could be several vendors already there. How do you balance staying focused and seeing what the next opportunity might be?

MACINTYRE We are not trying to change humankind. It is not our mission to be a billion-dollar company. Our mission is to be a premier provider in our market. ◩

Cafasso is Computerworld*'s senior editor, Client/Server Software.*

PHOTOGRAPHY BY SONNY WILLIAMS

COMPUTERWORLD
CLIENT/SERVER
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Where distributed computing meets business objectives

On June 15, Meet the 25 Top Users of Client/Server Technology

in a special edition of Computerworld Client/Server Journal

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EXCELLENCE

The Magazine

Client/Server. Where's it at in the real world? You'll find out in a special June 15 edition of Computerworld Client/Server Journal. With the expertise of Cambridge Technology Partners, a world renowned client/server consultancy, we surveyed more than 250 North American organizations to gauge their client/server prowess. Our special issue will list the 25 top most effective users of client/server technology by measuring their:

- *Investment in infrastructure.*
- *Application architecture and deployment.*
- *Applications' hard and soft benefits.*
- *Technology/business strategy alignment.*
- *IT management philosophy and culture.*

The Event

On June 15, at DCI's **Database & Client/Server World** in Boston, you're invited to a panel discussion at 9:30 that includes the Top Three companies, the survey judges and moderator Alan Alper, editor of Computerworld Client/Server Journal. Hear firsthand what went into selectin the Top 25 and how these organization made client/server work for them.

For more information on this panel, call (508) 470-3880.

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COMPUTERWORLD
CLIENT/SERVER
JOURNAL

Where distributed computing meets business objectives

COURTING DISASTER

BY RICHARD ADHIKARI

The 1993 bombing of New York's World Trade Center affected the businesses of many of the building's tenants, but publicly listed investment management company and trust bank Fiduciary Trust Company International was not among them.

Business continuity plans provided for the backup of Fiduciary's data center, consisting of a Digital Equipment Corp. VAXcluster, to a disaster recovery site at the Northridge, N.J., facility of Rosemont, Ill.-based Comdisco Disaster Recovery Services. The plans also included moving 400 essential staffers to that center to restore business services.

THE EXPLOSION OF DISTRIBUTED COMPUTING HAS RENDERED OBSOLETE MANY ORGANIZATIONS' CONTINGENCY PLANS

But like many large corporations, Fiduciary, a $100 million firm, had just begun introducing client/server systems and had not provided for them in its business recovery plan. That almost cost Fiduciary a customer: One very vulnerable server held data for the marketing department, which had to make a presentation to a potential customer the following week.

Fortunately, information systems staffers had disassembled the

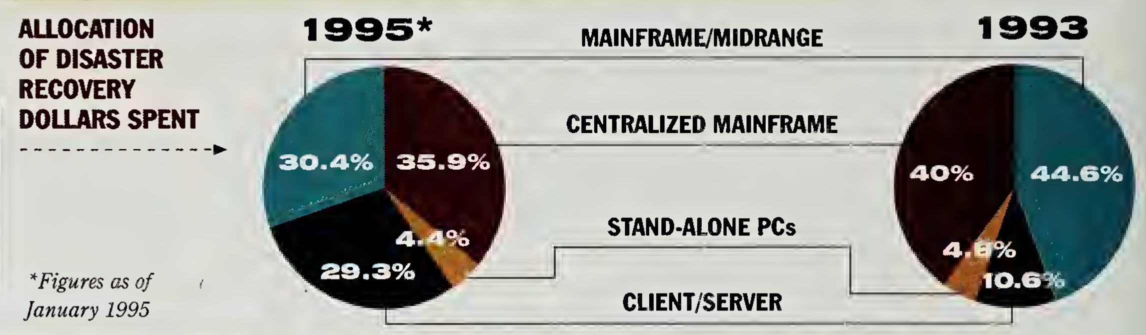
Continued from page 55

servers and extracted their hard drives before evacuating the building, so the data was not lost. Fiduciary managed to make the presentation and land the account.

"LANs grow up so fast that you don't realize what you have on them until something like this happens," said David Stone, executive vice president at Fiduciary. "They seem to have a life of their own."

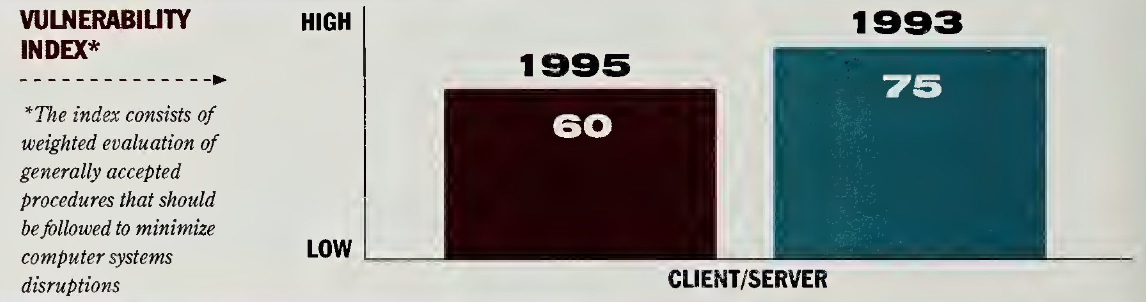
Since the bombing, Fiduciary, like a growing number of companies, has included client/server systems in its disaster recovery and business continuity plans. That's because the proportion of mission-critical applications running on client/server networks is increasing at warp speed. A recent survey of 300 organizations commissioned by disaster recovery provider Comdisco, Inc. in Rosemont, Ill., found that nearly 43% of client/server networks installed carry mission-critical data (see chart).

COMPANIES ARE SPENDING A GREATER PERCENTAGE OF THEIR DISASTER RECOVERY BUDGETS ON CLIENT/SERVER...



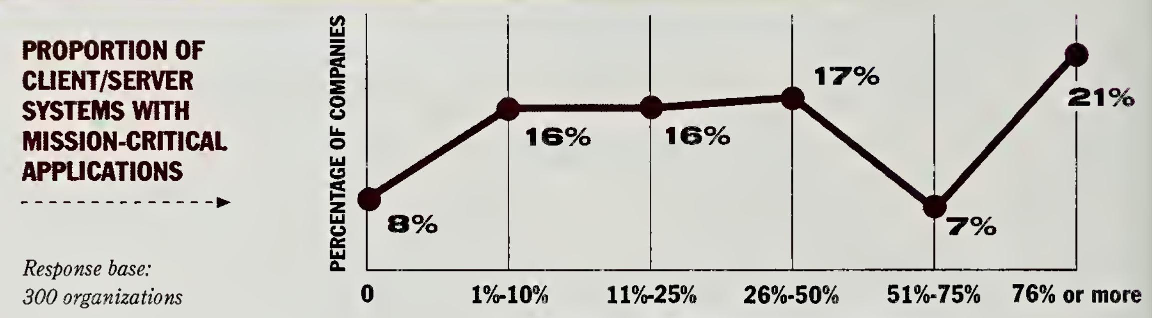
**Figures as of January 1995*

...WHICH IS TRANSLATING INTO IMPROVED CONTINGENCY PLANNING...



**The index consists of weighted evaluation of generally accepted procedures that should be followed to minimize computer systems disruptions*

...BUT MAY NOT TAKE INTO ACCOUNT THEIR GROWING DEPENDENCE ON CLIENT/SERVER SYSTEMS.



Response base: 300 organizations

Source: ICR Survey Research Group, Media, Pa. Commissioned by Comdisco, Inc. and Palindrome Corp.

CHANGE IN TACTICS

But planning for business continuity in the new age of distributed computing is very different from doing so in the mainframe environment, according to Dave Martorana, business recovery services development strategy manager at IBM Business Recovery Consultation Services in Sterling Forest, N.Y.

Planners in the client/server environment have to work out the technology needed for the backup site, down to the number of PCs, workstations and routers. They also must figure out who is essential in the event of a disaster; determine what type of data backup is used, in terms of both backup software and hardware (whether tapes or disks are used, for example, and whether servers are backed up to the mainframe or to tapes); and decide who takes care of tape rotation and backup procedures because these functions are often assigned to end users, Martorana explained.

Client/server's hardware and software diversity is what makes disaster recovery and business continuity planning so difficult, said Patricia Bennett, disaster recovery coordinator at Penn Mutual Life Insurance Co. in Philadelphia. "With client/server, you could have secretaries, executives who forget to back up data because it's not their job and it shouldn't be. You also have vendors whose work is a vital part of your processing but who are outside your control, such as the telephone companies."

An even bigger problem is that organizations still don't recognize client/server's potential pitfalls. Coopers & Lybrand, for example, recently completed a survey at one major client and found that 10 out of 20 servers were not backed up at all; the rest were backed up, but the data was stored on-site.

"They had not thought [disaster recovery] through; all they were concerned with was that they had a data integrity problem and wanted to restore a particular file," said Chris Miller, national director of business continuity planning at Coopers & Lybrand in Atlanta.

It usually takes a near-fatal experience to get most organizations' attention. Fiduciary's brush with catastrophe forced it to rethink contingency planning. For example, a consultant at the firm's insurance broker now participates in all of Fiduciary's monthly disaster and business recovery meetings.

Moreover, Fiduciary now backs up and archives daily on a number of servers provided by a Comdisco recovery site. The two systems running Fiduciary's mission-critical equity trading systems are backed up every five minutes to hot spares at the Comdisco site, Stone said.

Disaster recovery planning be-

PHOTOGRAPHY PREVIOUS PAGE BY STAN GAZ

gins with defining mission-critical applications and the servers on which they run. Critical applications should be kept separate from noncritical applications on servers to enable corporations to quickly bring up only the servers with critical applications, said Peter Wild, director of IS planning at $10.5 billion retailer Melville Corp. Corporations should also think about the unique hardware and software characteristics of their systems that may need to be replicated.

This especially applies to hardware because a company may need to have its own stock of hardware parts. Each department must develop its own business recovery plan for the LAN it owns; top management can then consolidate the different plans. This will allow management to decide which departments are critical, then drill down and restore only the critical applications in those critical departments, Wild added.

BUSINESS-CRITICAL CRITERIA

The criteria for determining mission-critical applications differ from corporation to corporation and industry to industry, said Penn Mutual's Bennett. For example, payroll is often considered a non-mission-critical application, but when a corporation has a contract with unionized staffers in which restoration of the payroll is defined as a priority project, payroll becomes mission-critical.

Whatever criteria you use to select mission-critical applications, the one rule of thumb is that business, rather than technology, is the driving force in business continuity planning. "No one stays in business because you get the machine up; they stay in business because they maintain service to their clients," Bennett said.

This emphasis on business means that plans must take nontechnical factors such as public relations into account. Take, for example, New York State Electric and Gas Corp. in Ithaca, N.Y., one of two major utilities servicing upstate New York. Its business recovery plan includes teams to handle various tasks, such as public and human relations; appraising the damage and calculating restoration costs; and restoring hardware, software and critical business applications, said Michael Sadler, an electronic data processing accounting specialist who is in charge of business recovery at the firm.

New York State Electric, which has $1.5 billion in sales, is migrating some applications off its two mainframes — an IBM 3390 600E and an Amdahl Corp. 300E — to a client/server environment. The utility plans to do a business impact analysis to evaluate what the client/server conversion requires in terms of backup and recovery, Sadler said

Business continuity planning should begin when projects are launched, Bennett said. Staffers in her department attend project meetings so they can bring up business continuity issues at the design stage. "We ask how what they're doing can be backed up and restored," she said.

Currently, Penn Mutual has five buildings in its campus connected by T1 links using TCP/IP. Its systems consist of an IBM 3090 400S mainframe, an RS/6000, an AS/400 and close to 1,000 PCs running terminal emulation programs and linked to the larger boxes through Ethernet or Token Ring LANs and gateways.

No matter what approach you take, remember that it must be suitable to the corporate environment. Larger firms with more complex systems will require more detailed plans than smaller ones. The bottom line, however, is that all organizations must plan to maintain their business processes in the event of a disaster.

Considering the increasing use of client/server systems, it's not a question of whether a corporation will be hit; it's a question of when, how often and at what cost.

Adhikari is a freelance writer based in Toronto.

PROPER PLANNING

Business continuity planning sounds good, but companies do not necessarily have to jump through all those hoops in order to ride out a disaster.

Take GE Capital Mortgage in Raleigh, N.C., one of the largest private insurers of home mortgages in the U.S.: It stores data applications on the host instead of distributing them out to clients.

"This gives you a three-tier client/server system where data is distributed from the superhost, which is the mainframe, down to the midlevel host, which is the Unix server, and is viewed there or is acted upon by the client, which is the desktop," said Jack Rabren, a methodologist at GE Capital.

The firm shares time on an IBM 4381 mainframe at the GE corporate supersite in Alpharetta, Ga. It also has IBM AS/400s and various computers from Sun Microsystems, Inc. as servers. At the front end, the firm uses IBM 3270s and 5250s and Digital VT-220 terminals as well as PCs running Windows 3.1 or OS/2.

GE Capital's architecture (desktop workstations access data via servers using SQL calls) offers built-in business continuity because of the following:

- **When a particular site goes down, only certain applications relying on data from that server will be down; others will be able to go on working.**
- **The company divides data access geographically. For example, East Coast users access data on one server, while West Coasters work with data on another.**
- **Office automation documents are stored on servers to isolate them from outages.**
- **Most corporate data is off-loaded from the mainframe to the midrange systems when needed and manipulated at the client. The transactions are then batch-loaded up to the mainframe.**
- **Finally, a lot of transactions are still paper-based in accordance with government regulations, so data can be restored from paper files if absolutely necessary.**

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CAREERS

RECRUITING, RETRAINING AND RETAINING CLIENT/SERVER EXPERTS

Perceptions Die Hard

BY ROY ALTMAN

The PC guys were snobs. They turned up their noses at the mere mention of "mainframe." They appended the sound of expectoration to "Cobol" as if it were part of the pronunciation. But the truth is, I wanted to be one of them.

I was working on the server side of a client/server development project — C/OS/2 talking to CICS/DB2 — and this was my first taste of the promised land. After surviving the wars as a mainframe programmer/analyst/designer, I realized that PC work was where the action was.

But I don't think it was just defensiveness that told me not to belittle my mainframe skills. Client/server expertise involves both mainframe and workstation parts. PC programmers aren't used to issues such as resource contention, data integrity and recoverability, which are paramount in multiuser environments.

When it came to designing for contentious environments, I had something over the PC guys. I just lacked GUI/object-oriented skills.

So I decided to get educated. I took C++ courses at New York University and Columbia. I also took a Powersoft PowerBuilder course offered by my employer.

I found that some concepts of object-oriented design are significantly different from traditional methods. However, I realized that adaptability is the name of the game. After all, it's just another way of getting information to the customer, which no IS professional should ever lose sight of.

Yet no one will hire somebody who just has training in a skill; experience is a must. Experience gained outside of the job also counts.

Opting then to develop a client application at home, I chose one relating to a personal hobby because it gave me motivation. It's also better to make mistakes on something not too serious, so using Powersoft's Watcom and PowerBuilder, I developed a runner's training log that tracks training miles and races.

I found that choosing the right software tools is key. Ideally, the tools should be accessible and familiar, they should require skills that are transferable to other platforms, and they should be written in a language that can be supported. Also, make sure you identify an expert who will let you bug him with questions.

Once you have experience under your belt, you have to sell yourself. You can be the best systems person in the world, but you have to tell people; nobody else will. Most of us would rather let our work do the talking, but unfortunately, that's not how you get recognized. You often get defined by your work acronyms (i.e., CICS, Cobol).

And sell myself I did. I told anyone at my company who would listen — most significantly, marketing reps and potential clients — about the client/server courses I'd taken and my experience.

So thumb your nose at the PC jocks. A little arrogance will go a long way in the information business. ◪

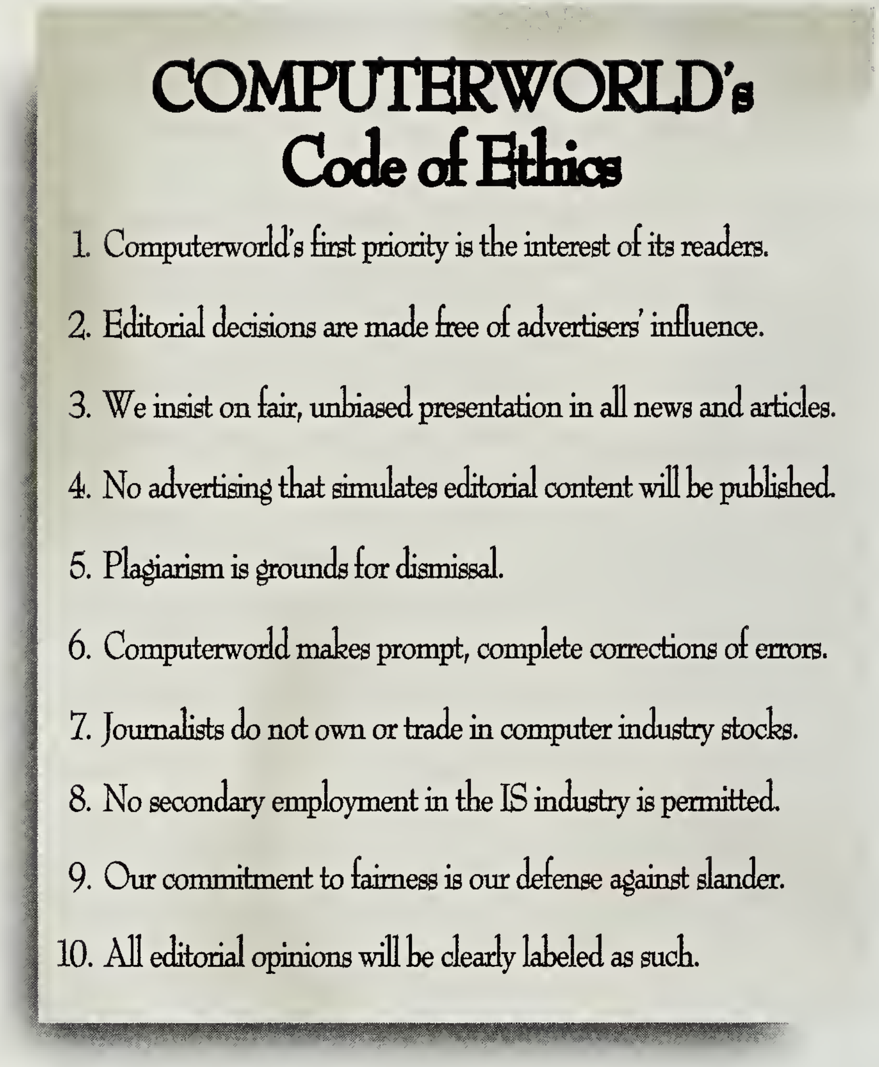
Altman, senior consultant at Trecom Business Systems in Edison, N.J., is now working on a client/server project.

QUICK TIPS

Many observers believe that one-third to one-half of today's Cobol programmers won't transition to client/server. Here are some suggestions made at the recent Client/Server West Conference in San Jose, Calif., to help IS organizations manage:

- **Steve Jobs, chairman of Next Computer: Hire object-oriented "hotshots" to blend in with Cobol programmers. The object-oriented programmers can teach the old-timers new tricks, while the Cobol bit-twiddlers can help the hotshots inject business discipline into their programs.**
- **Alan Kaye, Apple fellow and futurist: IS's role should be to improve the objects pioneered by end users with graphical 4GLs. This will allow IS to complete the transition from carpenter to architect.**

ILLUSTRATION BY TED PITTS



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COMPUTERWORLD

Object standards accelerate

Microsoft blesses emerging standard

By Melinda-Carol Ballou

Microsoft, page 14

IBM pulls mainframe into new development role

By Ed Scannell

IBM, page 14

The object is money

Success strains SAP Support

By Rosemary Cafasso

SAP, page 129

COMPUTERWORLD'S EIGHTH ANNUAL SALARY SURVEY

SPECIAL REPORT

CASH ON DELIVERY

Computerworld's Eigth Annual Salary Survey finds that IS professionals' pay is increasingly linked to their performance, and many more wish it was. Also, our readers reveal which jobs are hot, and where to find the biggest paychecks and benefits packages. MANAGEMENT, page 82. Also, see NEWS, page 20.

Newspaper

All clears for telecommuting

By Mitch Betts

Telework support

Telecommuting, page 129

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COMPUTERWORLD

WHAT'S NEW

A ROUNDUP OF NEW PRODUCTS AND REVIEWS

INSIDE

NEW PRODUCTS

- Dataware Technologies' relational/multimedia link
- MediaWay's multimedia DBMS
- Objectivity's Objectivity/DB database
- MITI's SQR3 report writer

FIRING LINE

- Sybase's SQL Server Manager

Oracle Personalizes Desktop

By Christopher Lindquist

The gulf between robust mainframe relational databases and raw PC products is narrowing. More powerful PC hardware has helped close the gap, with large-system databases making their way to PC servers and PC-based products becoming more capable business tools. Oracle Corp.'s recently released Personal Oracle7 brings things full circle.

Don't let the cute "database for the rest of us" name fool you. This is really Oracle7, slimmed down somewhat but ready to run on anything as small as a 386 with 8M bytes of RAM. But don't come looking for typical PC accoutrements such as tool bars, graphical user interface builders or quick-read manuals.

While Personal Oracle7 makes the big leap from server to desktop, it still has some steps to take before it can compete on the user-friendly front with the likes of Microsoft Corp.'s Access or Borland International, Inc.'s Paradox for Windows.

To be fair, such competition is not what the Redwood Shores, Calif., company had in mind. Many current Oracle7 users who simply want to access their data anywhere will not mind the interface flaws. Personal Oracle7 lets developers create database applications on a PC that can then run on any of the near-100 platforms Oracle7 supports, which is a boon for consultants or developers who must distribute a database to multiple, unconnected users running on different platforms.

TEST DRIVE

Personal Oracle7

- Brings large-system database power to the PC
- Retains security features to maintain data integrity on the PC
- Misses the ease of use found in other desktop databases
- Lacks typical PC accoutrements such as tool bars and easy manuals

At the same time, Personal Oracle7 retains the security features required for data integrity. About all that's missing is an ability to perform parallel queries and other distributed functions — functions that probably won't be missed on a database intended to run on a stand-alone machine. (Oracle is offering an Enterprise Edition of Personal Oracle7 that includes distributed capabilities.)

Just be sure you have the proper hardware. Oracle recommends at least 16M bytes of RAM, and our tests with an 8M-byte 486DX2/66 machine suggest that you'd be wise to listen. Even simple queries left some thumb-twiddling time, and opening any of Oracle's tools on a lower-end machine tested both our hard drive and our patience.

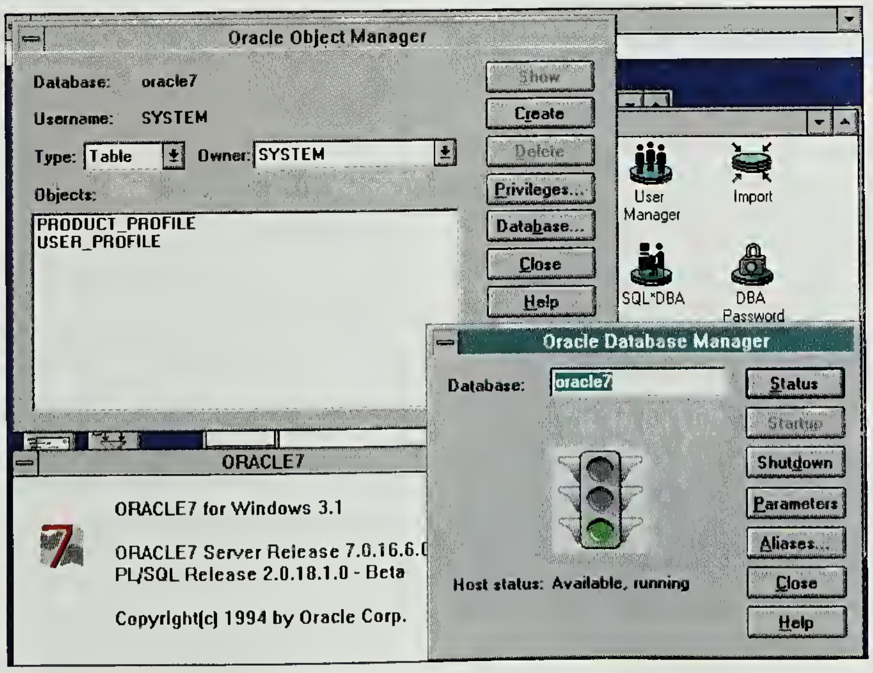
Oracle does include certain features to make setting up your database less of a headache, including a preconfigured sample database that can act as a foundation for your own development. While some of the tools, including the Database and User managers, were designed to let trained users start up and manage users on a database fairly easily, most of the powerful components such as the development environment, the Object Manager and the SQLLoaderQ are more suited to consultants and developers than to casual database users.

Fortunately for anyone who wants Oracle power without becoming a developer, Oracle says it plans to bundle Personal Oracle7 with easier-to-use front-end tools, such as the upcoming PowerObjects object-oriented query/interface builder as well as third-party interface tools.

One feature of Personal Oracle7 is particularly user-friendly: Free, 90-day review copies of the product are available over the World-Wide Web at http://www.oracle.com/. If you don't have a Web connection or would rather not spend time downloading the file, call Oracle's toll-free number to request a copy.

Personal Oracle7 costs $399.

Oracle, (800) 492-9870. ◪



Database: oracle7
Username: SYSTEM
Type: Table Owner: SYSTEM
Objects:
PRODUCT_PROFILE
USER_PROFILE

ORACLE7 for Windows 3.1
ORACLE7 Server Release 7.0.16.6.0
PL/SQL Release 2.0.18.1.0 - Beta
Copyright(c) 1994 by Oracle Corp.

Database: oracle7
Host status: Available, running

Lindquist is the technical editor of Electronic Entertainment magazine.

Database News: Object-oriented, Multimedia and Report Writing

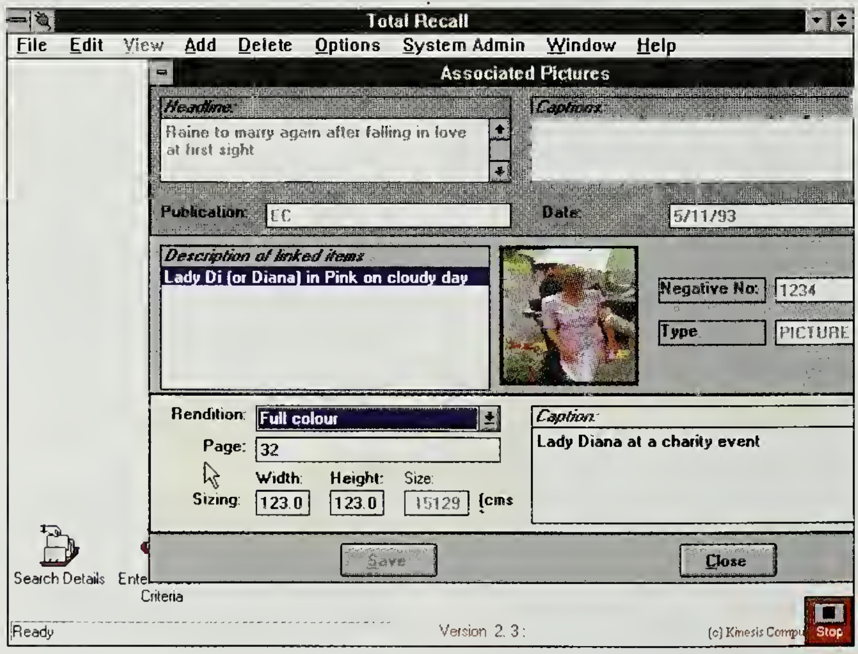
RELATIONAL/MULTIMEDIA LINKS

TOTAL RECALL

Dataware Technologies,
Cambridge, Mass.

WHAT: Total Recall enables developers to build applications that link leading relational database management systems and fourth-generation languages (4GL) with Dataware's full text management system, BRS/Search. Applications can access structured data, text, images and multimedia data elements through a single application programming interface (API).
WHERE: Runs on Unix and Digital Equipment Corp. VMS servers and on Unix, Windows 3.1, NextStep and Macintosh System 7 clients. Supports databases from Informix Corp., Oracle Corp. and Sybase, Inc. as well as The ASK Group, Inc.'s Ingres, Microsoft Corp.'s SQL Server and any Open Database Connectivity-aware environment. 4GL support includes Powersoft's PowerBuilder, Microsoft's Visual Basic, Gupta Corp.'s SQL Windows, Informix's Hyperscript and any 4GL with Dynamic Link Libraries support.
HOW MUCH: Offered as an API, a series of application libraries or as a complete system. Price is 20% of the BRS/Search engine, which lists for $9,500 in a four-concurrent user system.
WHEN: Available immediately.
USER FEEDBACK: ASA Legal Systems, Inc., a Blue Bell, Pa., systems integrator, is using Total Recall as middleware between a conflict of interest application and BRS/Search in a system installed at Boston law firm Hale & Dorr, said Bill Baker, company president.

"At the blink of an eye, it comes up with the number of hits and provides in another window the ability to load data about the hit, click on the information and load more data over from Ingres," he said.
PHONE: (617) 621-0820



Headline: Raine to marry again after falling in love at first sight
Captions:
Publication: EC
Date: 5/11/93
Description of linked items: Lady Di (or Diana) in Pink on cloudy day
Negative No: 1234
Type: PICTURE
Rendition: Full colour
Page: 32
Sizing: Width: 123.0 Height: 123.0 Size: 15129 (cms
Caption: Lady Diana at a charity event
Ready
Version 2.3 :
(c) Kinesis Compu

With Total Recall, applications can be built to access various media

DATABASE

OBJECTIVITY/DB 3.5

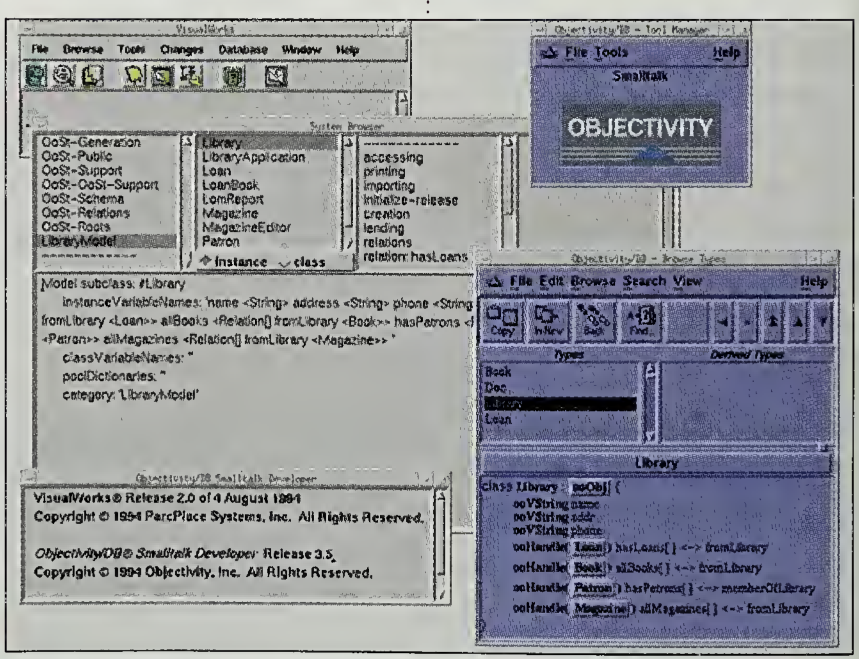
Objectivity, Inc.,
Mountain View, Calif.

WHAT: This new version of the Objectivity/DB database includes support for ParcPlace Systems, Inc.'s Smalltalk; the option to deploy server-intensive applications on a single, high-performance, multithreaded server (rather than on distributed machines); and the ability to share objects among C++, Smalltalk or SQL languages.
WHERE: Runs on Microsoft Corp.'s Windows-, 486- and Intel Corp. Pentium-based PCs as well as Hewlett-Packard Co.'s HP/UX, IBM's AIX, Silicon Graphics, Inc. servers, Sun Microsystems, Inc.'s SunOS and Solaris servers, Digital Equipment Corp.'s VAX and Alpha and Data General Corp.'s Aviion.
WHEN: Available first-quarter 1995.
HOW MUCH: Objectivity/DB 3.5 costs $1,750 for a single-user server, with separate client licenses for C++, Smalltalk or SQL applications.

SuperClient licenses (which do not require a server) are also available.
USER FEEDBACK: When the Joint Armed Forces needs to act quickly, it relies on Objectivity/DB to generate a crisis action plan.

"They use it to store [multimedia objects such as] images of remote locations or mapping information," said Rob Rejent, software engineer at BBN Systems & Technologies, a Southern California consultancy that developed the application.

BBN is beta-testing the new version of Objectivity to ensure compatibility with the current version. With the new Smalltalk support, Rejent can quickly develop user interfaces in ParcPlace's Visualworks that link into Objectivity/DB.
PHONE: (415) 254-7100



```
Model subclass: #Library
    instanceVariableNames: 'name <String> address <String> phone <String
fromLibrary <Loan>> allBooks <Relation[] fromLibrary <Book>> hasPatrons <
<Patron>> allMagazines <Relation[] fromLibrary <Magazine>> '
    classVariableNames: ''
    poolDictionaries: ''
    category: 'LibraryModel'
```

VisualWorks® Release 2.0 of 4 August 1994
Copyright © 1994 ParcPlace Systems, Inc. All Rights Reserved.

Objectivity/DB® Smalltalk Developer Release 3.5
Copyright © 1994 Objectivity, Inc. All Rights Reserved.

```
class Library : ooObj {
    ooVString name
    ooVString addr
    ooVString phone
    ooHandle(Loan) hasLoans[] <-> fromLibrary
    ooHandle(Book) allBooks[] <-> fromLibrary
    ooHandle(Patron) hasPatrons[] <-> memberOfLibrary
    ooHandle(Magazine) allMagazines[] <-> fromLibrary
```

Objectivity/DB is able to share objects among different languages

REPORT WRITER

SQR3 WORKBENCH

MITI,
Long Beach, Calif.

WHAT: SQR is a multidatabase report writer that uses a fourth-generation language-like procedural language. The new version, SQR3, adds support for graphics, the ability to execute reports on the server, Windows support and the ability to print multiple reports from the same data. The suite includes a report writer, a quick prototyping tool, a developer's kit and a runtime version.

WHERE: Runs on a variety of databases including IBM's DB2, Oracle Corp.'s Rdb, Microsoft Corp.'s SQL Server and those from Oracle, Sybase, Inc., Informix Corp. and Gupta Corp. SQR also supports various operating systems including Unix, DOS, Windows, OS/2 and MVS.

WHEN: Shipping now.

HOW MUCH: $500 for Windows clients; $1,200 on Unix.

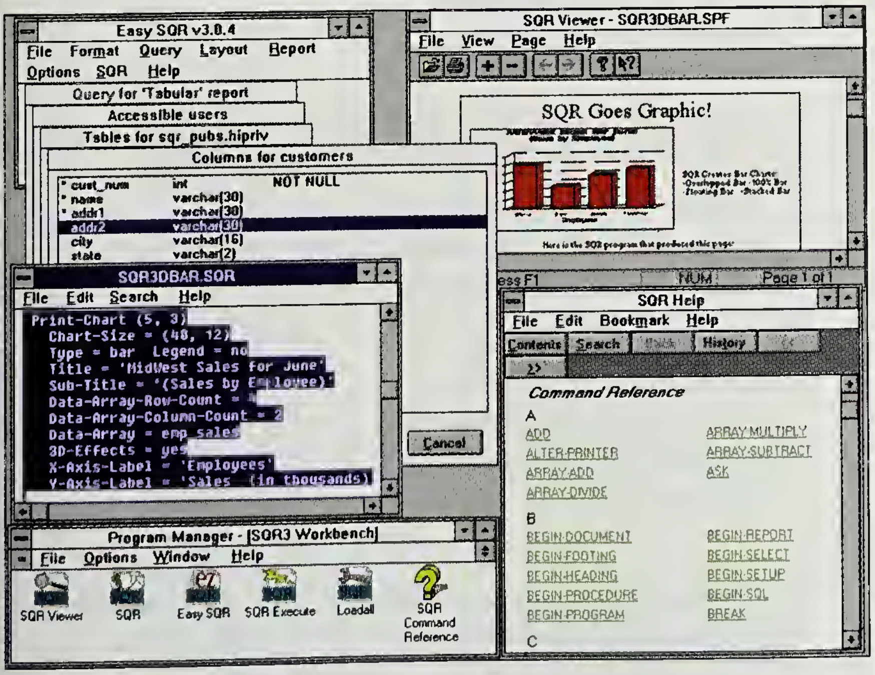
USER FEEDBACK: This is no ordinary report writer, according to SQR users. "The big difference is, you don't run out of power," even with 1,000-page reports with "fancy output," said James Rader, project manager at Intelsat, an international satellite firm in Washington. The firm's multilingual invoicing and scheduling systems are written in SQR.

Intelsat is now installing SQR3 on its HP 9000 Unix server and is looking forward to the new graphics capability. He also lauded SQR3's portability. "We had to move it from DOS to Unix, and [the company] wanted me to file a project plan. Instead, I [file-transferred] it to Unix, recompiled it, tested it and, a couple of minutes later, asked the users if they'd like to try it. It blew their minds."

Better printing capability is the key for Joe Trezzo, executive vice president at The Ultimate Software Consultants, Inc. in Lombard, Ill.

"In the current version, you can only print one [file] at a time. But now you can be writing a report and output detailed division information as well as summary statistics for each division," up to 99 outputs at a time, he said.

PHONE: (310) 424-4399



```
* cust_num     int            NOT NULL
* name         varchar(30)
* addr1        varchar(30)
  addr2        varchar(30)
  city         varchar(16)
  state        varchar(2)
```

```
Print-Chart (5, 3)
  Chart-Size = (48, 12)
  Type = bar  Legend = no
  Title = 'MidWest Sales for June'
  Sub-Title = '(Sales by Employee)'
  Data-Array-Row-Count =
  Data-Array-Column-Count = 2
  Data-Array = emp_sales
  3D-Effects = yes
  X-Axis-Label = 'Employees'
  Y-Axis-Label = 'Sales  (in thousands)'
```

A
ADD
ALTER-PRINTER
ARRAY-ADD
ARRAY-DIVIDE
ARRAY-MULTIPLY
ARRAY-SUBTRACT
ASK

B
BEGIN-DOCUMENT
BEGIN-FOOTING
BEGIN-HEADING
BEGIN-PROCEDURE
BEGIN-PROGRAM
BEGIN-REPORT
BEGIN-SELECT
BEGIN-SETUP
BEGIN-SQL
BREAK

C

SQR3 adds support for graphics such as charts and bar codes

MULTIMEDIA DBMS

MEDIADB DBMS 2.0

MediaWay, Inc.,
Santa Clara, Calif.

WHAT: MediaDB is a multimedia database designed to store, organize, classify and deploy digitized photos, sound clips, video, etc. New features include interactive query and browsing tools, SQL support, multimedia-specific transaction management and the ability to abstract, summarize, compress or decompress large objects to avoid network bottlenecks.

WHERE: Runs on Microsoft Corp.'s Windows and Windows NT, Apple Computer, Inc.'s Macintosh and Sun Microsystems, Inc. SunOS clients. Servers include Novell, Inc.'s NetWare, Windows NT, Macintosh and SunOS.

WHEN: Shipping now.

HOW MUCH: Development system pricing starts at $10,000. Runtime versions start at $10,000 for 20 users.

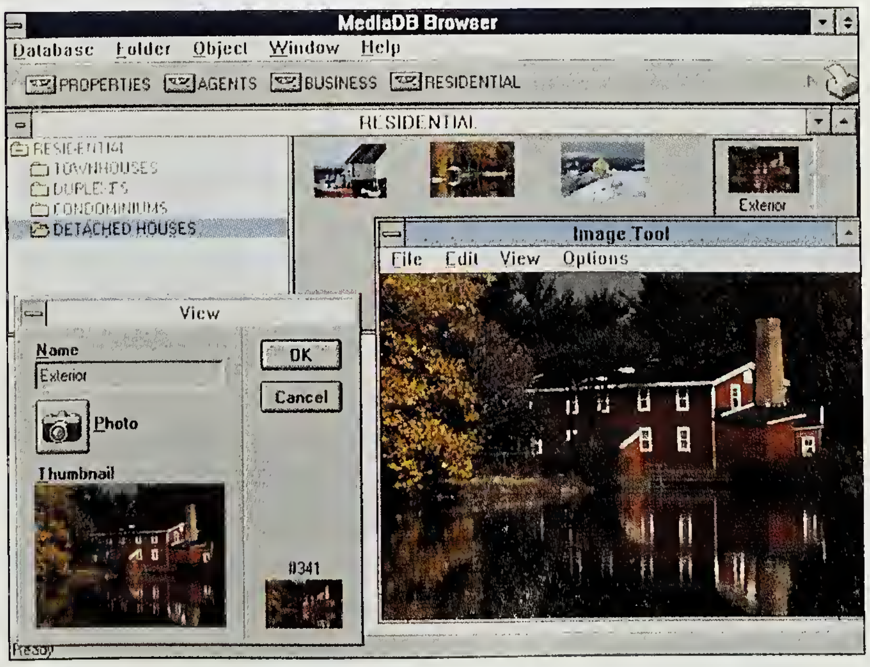
USER FEEDBACK: MediaDB helped Terry Robie Industrial Advertising, Inc. in Toledo, Ohio, gain control of its communications resources. Now the advertising company is building similar applications for manufacturers and marketing firms. "You know how companies are re-engineering their computer systems? Well, the same holds true for multimedia," said Greg Dodge, vice president of new media at the company. "It all exists in analog form somewhere in the company, but not everyone can readily use them."

It took Dodge a year to find the right database for his needs. "Most other tools are existing databases that added multimedia capability," he said. Performance problems aside, you have to convert the objects to "a format that's a long string of information. You have to read the whole string as opposed to seeing it natively," he added.

Key to MediaDB's appeal, Dodge said, is the fact that the creative people can structure the application, while "hard-core programmers" simply revise and customize the code.

Terry Robie uses MediaDB to create electronic catalogs for OEMs, architects and engineers.

PHONE: (408) 748-7400



Name: Exterior

MediaDB can be used to internally manage drawings and photos

Sybase Updates Database Management Tool Kit

SQL SERVER MANAGER FEATURES IMPROVED WINDOWS INTERFACE BUT REMAINS LIMITED TO SYBASE SYSTEM 10

Sybase, Inc. has put SA Companion, its database administration tool, through some conspicuous changes. Once character-driven, the tool now sports a contemporary Windows interface and a new name: SQL Server Manager.

Despite the remodeling, its mission remains the same: to provide server management tasks such as backup and storage allocation. But it has two major limitations, evaluators said: It works only with Sybase System 10, and while it manages multiple servers, it can make changes to only one at a time.

CSJ FIRING LINE

An enterprise version called Enterprise SQL Server Manager is due by midyear and is expected to allow modifications to multiple servers in a single operation.

On the whole, users said SQL Server Manager provides the basic functionality to create, view and alter data types. But because it does not have an automatic code-generation facility, creating triggers and writing scripts can be cumbersome.

This product evaluation was completed through in-depth interviews with four users whose companies run the product in a production environment. Evaluators included an oil and gas company, a telecommunications company, a retail company and a health care provider. The number of servers managed by SQL Server Manager at an evaluator's site ranged from six to 13.

The format for this evaluation was developed with Howard Rubin and Associates and Technology Investment Strategies Corp.

EASE OF USE The new graphical user interface not only improves the product's ease of use, evaluators said, but also adds to its flexibility. That's because Sybase did not completely eliminate the character-based interface. Users can still use dialog screens, but because database devices are now represented by icons, they don't necessarily need to know SQL syntax.

The graphical drag-and-drop capabilities are handy for backups and establishing object relationships, evaluators said. The interface also keeps users from getting lost in the system — a common problem with multiple servers.

OIL AND GAS: "With some tools, it can get confusing where you are if you have multiple tables from multiple servers open at the same time. But Sybase's interface accurately

SYBASE'S SQL SERVER MANAGER

Sybase, Inc., Emeryville, Calif. ☎ *(800) 879-2273*

TOTAL SCORE 7.4

The total score shows that users were very satisfied with the product's overall adeptness, even though it will not integrate into Sybase's new enterprise-level product.

EASE OF USE 7.8

Users said its new graphical interface not only uncomplicates the product but provides administrators with a clear, accurate view of where they are in their systems.

SERVER MANAGEMENT FUNCTIONS 7.3

Functionality is best-suited for maintaining existing servers and databases. Designing new databases is hindered by its lack of an automatic code generator.

NAVIGATION 7.5

Users said navigation can be significantly optimized by using its environment customization tools.

SECURITY 8.5

Provides appropriate, reliable security levels for server applications.

PERFORMANCE AND SCALABILITY 8.8

Although only able to individually manage multiple servers, users were very satisfied because the product does what it claims to do.

REPORTING 4.5

Limited functionality but supports standards for integration to third-party applications.

Scores represent the average ratings of the four evaluators and are based on a 1-to-10 scale where 10 represents extremely satisfied and 1 represents not satisfied at all. Total score is the average of the category ratings.

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(g) Windows
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SERVER MANAGEMENT

Users were generally pleased with SQL Server Manager's management capabilities and seamless access to the functions in the Tivoli Systems, Inc. Tivoli Management Environment architecture, the framework Sybase used for this management application.

HEALTH CARE: "Any functions or utilities that can be done or accessed in Tivoli can be used in Sybase."

OIL AND GAS: "Since nothing around here stays the same very long, I'm always changing user connections and memory allotment as our applications change. Maintaining our environment is really easy with this product."

But one evaluator lamented the weak database design of the tool, which requires you to manually code triggers and queries.

OIL AND GAS: "It's great at creating, viewing and maintaining databases, but it doesn't have a code-generation facility, which means you have to write triggers yourself."

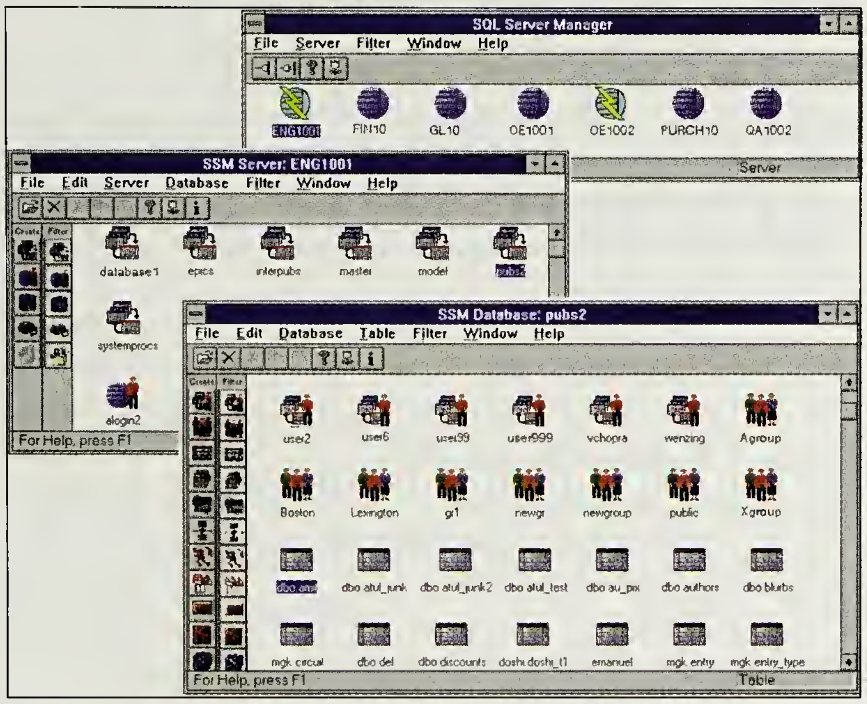
NAVIGATING OBJECTS

SQL Server Manager excels at customizing views, evaluators said. This, they said, is key to efficient navigation.

TELECOMMUNICATIONS: "There are enough filters and grouping functions to let you define and prioritize just the views you need to look at."

The tool also provides two navigation techniques: using windows and icons or jumping from one dialog window to another. At least one user was unimpressed.

OIL AND GAS: SQL Server Manager "doesn't operate as quickly or let you run multiple scripts as well as some other tools like [Embarcadero Technologies, Inc.'s] DBArtisan [for Windows]."



SQL Server Manager delivers graphical control over the different Sybase servers being managed (top window); a single server's contents, such as databases, log-ins and devices (middle window); and the aspects of a single database (bottom window)

SECURITY

All of the users said the security measures in SQL Server Manager were stable and sufficient for their needs.

RETAIL: "It's designed to assign the type of security levels needed for server applications," such as passwords and access privileges.

PERFORMANCE/SCALABILITY

The number of servers SQL Server Manager can manage is limited only by the number an administrator can handle individually.

HEALTH CARE: "We only have three servers, so making changes to each one separately is not a big deal."

RETAIL: "Managing a few servers is no big deal, but if we grow beyond our administrative means, this setup is not going to cut it."

Sybase said it expects users at larger sites to upgrade to Enterprise SQL Server Manager; they will pay only the difference between the two products, said Alex Moissis, product marketing manager at Sybase.

But the enterprise product will render SQL Server Manager obsolete for many unless users sequester a finite number of servers from the enterprise to be managed separately.

HEALTH CARE: "We can't build what we already have into an enterprise setup. We will have to deinstall [SQL Server Manager] when we buy the new product."

REPORTING CAPABILITIES

For report-writing functions, Sybase provides the basics but otherwise subscribes to a best-of-breed approach. Third-party tools can be integrated through Simple Network Management Protocol and application programming interfaces.

TELECOMMUNICATIONS: "Reporting is extremely important, but I didn't buy it to be a reporting tool. I already have one that I'm familiar with."

OIL AND GAS: "We don't have a report writer, but I can do a query, output it to a Unix file and then bring it into a word processor. You need some utilities to do this, but I wouldn't consider it hard once you're familiar with it." ◪

Compiled by Kevin Burden, Computerworld's senior researcher, Firing Line/Scorecard.

SYBASE RESPONDS

QUERIES:

Sybase is working to enhance query capabilities to SQL Server Manager, but the vendor did not specify whether the product will eventually allow multiple queries to be opened at one time.

CODE GENERATOR:

The company is "investigating additional facilities to aid in the creation of SQL scripts, triggers and stored procedures," a spokesman said.

NAVIGATION:

"Our plan is to provide SQL Server Manager users with further navigation alternatives so that they can select the technique that best meets their needs," the spokesman said.

REPORT WRITING:

Sybase is planning to continue with its best-of-breed approach for report generation. Administrators can use their preferred report generating tool to view SQL Server Manager management information.

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Complicated Simplicity

STUDIES SUGGEST 99.9% SOFTWARE RELIABILITY CAN BE ACHIEVED WITH 20% MORE EFFORT.

Complex is easy; simple is difficult. This is a succinct description of success and failure with new technology. To fail with distributed technologies is easy: rapid prototype to production, buy a tool, send people to class, and create, as a result, complex systems. Successful systems are simple aggregations of simple components.

To build simple solutions, you must focus on management and process, not technology, and implement software engineering disciplines that create simple, elegant, well-built software.

There are two forms of failure. The most obvious is unreliable systems; the other, systems that fail to meet expectations.

The primary reasons client/server systems are less reliable than their mainframe counterparts are immature technology and system builders' lack of experience.

Contributing factors can be found in the industry's acceptable levels of reliability. Typically, the generally accepted practice is to let systems go into production 90% reliable (see Larry Putnam's book *Measures for Excellence*, Yourdon Press, 1992). This practice continues with distributed technologies and causes manifold reliability problems.

A system's reliability is the product of the reliability of all system components. A client/server system that uses only two components with a reliability of 90% will have a reliability of only 81%. A system of 10 components, each with an acceptable 90% reliability, would be only 35% reliable (0.9 to the 10th power)!

The solution, which may sound flippant, is to build more reliable software. Putnam's studies suggest 99.9% reliability can be achieved with 20% more effort. We can increase reliability and other aspects of quality through process — the point of the Software Engineering Institute's software maturity levels (*Managing the Software Process*, Watts S. Humphrey, Addison-Wesley, 1990) and the ISO 9000. Smaller teams working on smaller deliverables have increased reliability and productivity. Design-driven and managed projects introduce fewer integration defects but require more discipline in analysis and design. And well-engineered, reused components mean more reliable systems.

An inability to meet expectations is a different matter. Initial client/server projects are tough to justify to fiscally conscious management. A silver bullet mystique — the belief that a binary decision such as buying a new tool provides immediate, lasting benefits — sets unreasonable expectations.

So how do you prove success? Without rational metrics to monitor and track data as you introduce change, you can't justify investments in training, process change, tools or technology changes or even evaluate and improve the effectiveness of new strategies, tactics, techniques and technology.

The solution is simple: Measure what you do, and track how much you improve. Lack of measurement is the major cause for management's perception of IS's failure. Showing management tangible progress is more rewarding than sharing apocryphal stories. Success in client/server means building simple software components and assembling systems and new components from them.

Building simple software requires a development organization to re-engineer itself to create reusable analysis, design and code artifacts; instill proper infrastructure and discipline to reuse those artifacts; implement statistical process quality management; and decompose software life cycles into projects of "simple" deliverables by small teams.

Success with client/server is simply management, and that is difficult. ◪

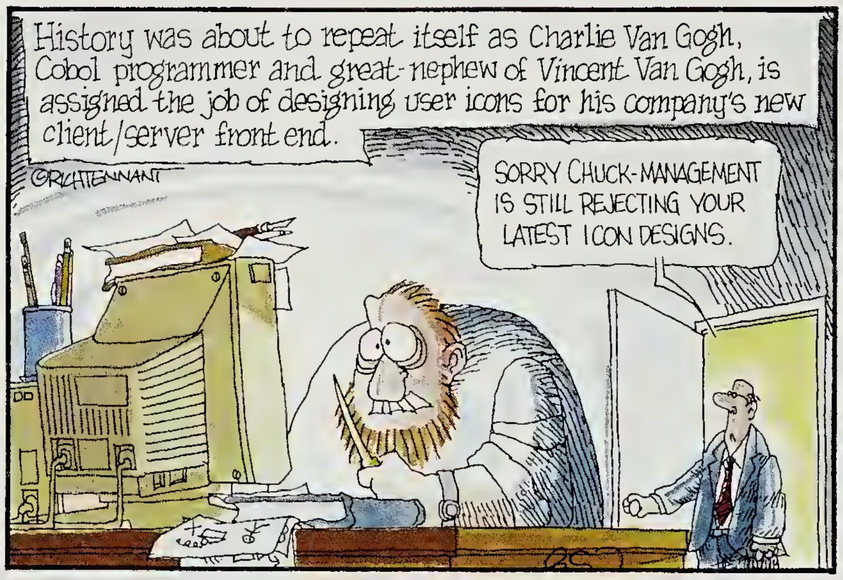
JIM STIKELEATHER

Stikeleather is a consulting partner at The Technical Resource Connection in Tampa, Fla. He was formerly IS director at a major retailer. His Internet address is stike@delphi.com.

PHOTOGRAPHY BY CHARLES TROTTA

The Back Page

THE 5TH WAVE


History was about to repeat itself as Charlie Van Gogh, Cobol programmer and great-nephew of Vincent Van Gogh, is assigned the job of designing user icons for his company's new client/server front end.
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■ **THE INFORMATION SUPERHIGHWAY**
Naples, Fla., June 19-21
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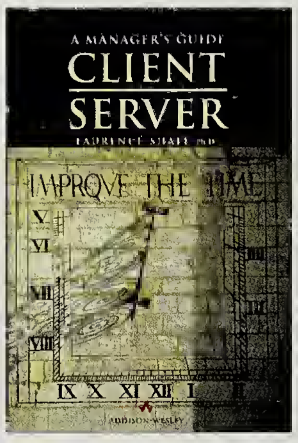
Book Reviews

■ **CLIENT/SERVER: THE 10% YOU NEED TO KNOW,** *Randy Langel*

If you are just starting your journey into the world of client/server, a good primer is almost a must. *Client/Server: The 10% You Need to Know* is just that: the 10% that makes up a broad overview of the technology and what it takes to get your business in alignment with that technology to avoid costly deployment mistakes. The book deals with changes in process, culture and technology and then distills that even further into easily digested "rules of thumb" sprinkled throughout. These rules of thumb express the new mores of client/server computing in sound-byte form. The book includes a comprehensive glossary containing the language of a new form of computing. The 167-page book costs $29.95; book and CD-ROM package costs $249. ISBN: 0-9643104-0-6. To order, call IBM at (800) 200-9933.

■ **CLIENT/SERVER: A MANAGER'S GUIDE,** *Laurence Shafe*



This book delivers exactly what the title says. Directed at managers charged with exploring and/or implementing client/server computing, it handles the subject in a direct and intelligent manner. The author takes the view that "the aim of client/server computing is to make the organization more effective." Some of the subjects *Client/Server: A Manager's Guide* explores include choosing a desktop operating system, understanding object-oriented programming and selecting the best development tools for your environment. The back of the book contains case studies, both successful and not so successful, that demonstrate how these ideas get put into practice. Fireman's Fund Insurance Co. and Grossman's are just two of the case studies you'll find there. The 125-page book costs $19.50. ISBN: 0-201-42790-7. Addison-Wesley Publishing Co. (800) 822-6339.

Other books to consider:

■ **HANDBOOK OF DATA CENTER MANAGEMENT,** 800 pages; $150; ISBN: 0-7913-2130-4. Auerbach Publications (800) 950-1216.

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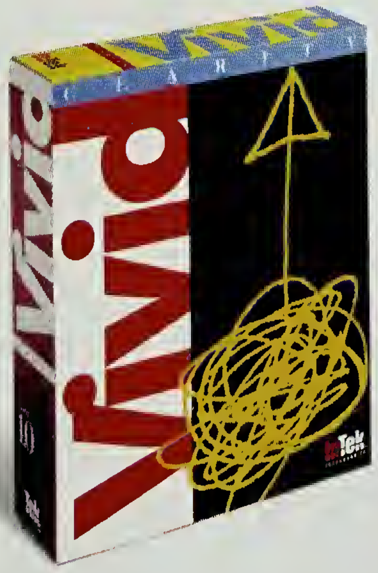

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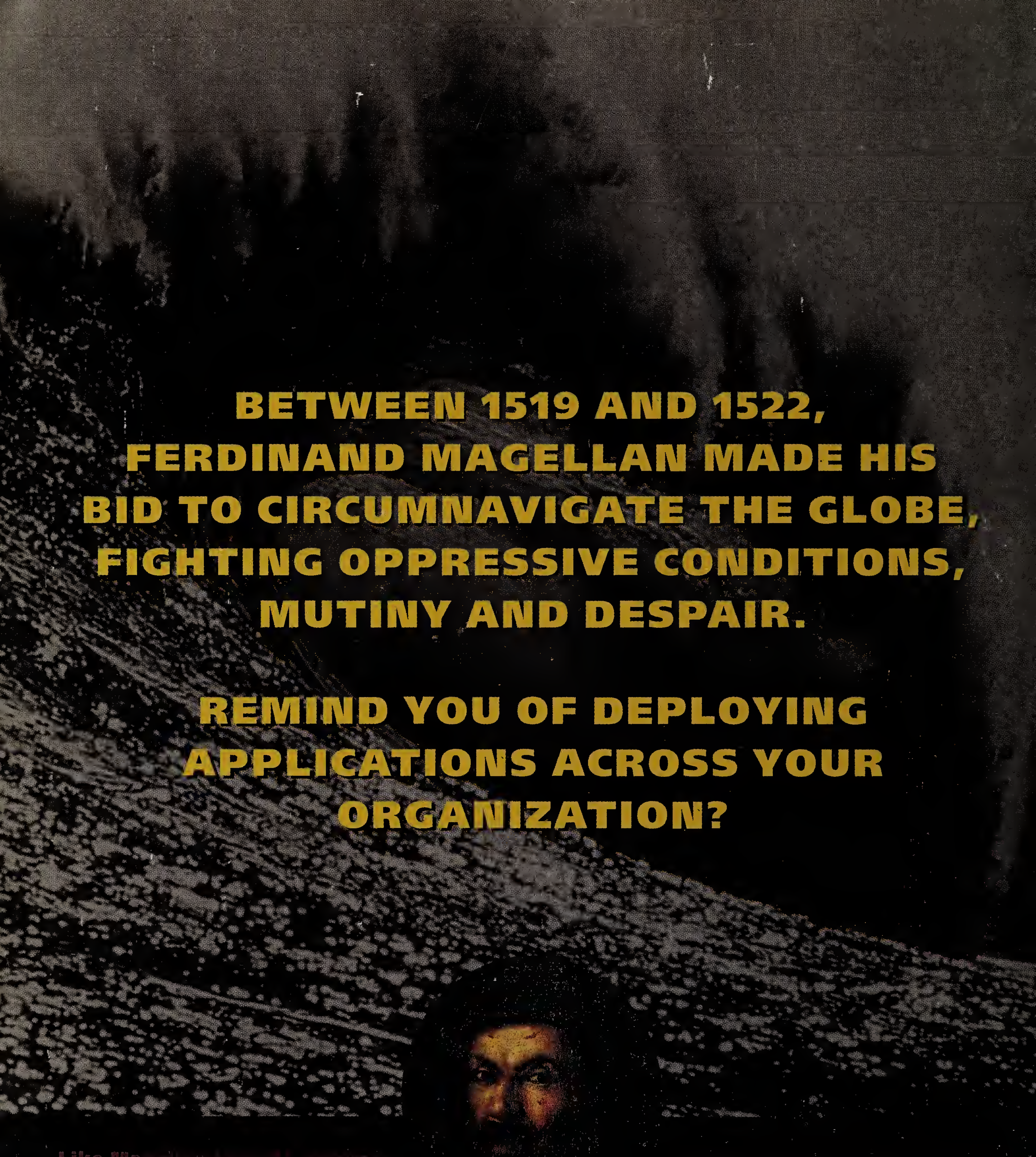

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REMIND YOU OF DEPLOYING APPLICATIONS ACROSS YOUR ORGANIZATION?

Like Ma[illegible] tion developers [illegible] dealing with [illegible] for them, so [illegible]

PROGRESS [illegible] handle the tough stuff [illegible] building new applications with complex logic, heavy [illegible] access and high-volume transaction processing. And only PROGRESS provides a development environment fully capable of developing large-scale, client/server applications that ex[illegible]

PROGRESS
SOFTWARE

Development and Beyond